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What is the Evidence Telling Me and How Do I Become and Evidence Detective?

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Let Me Introduce Myself

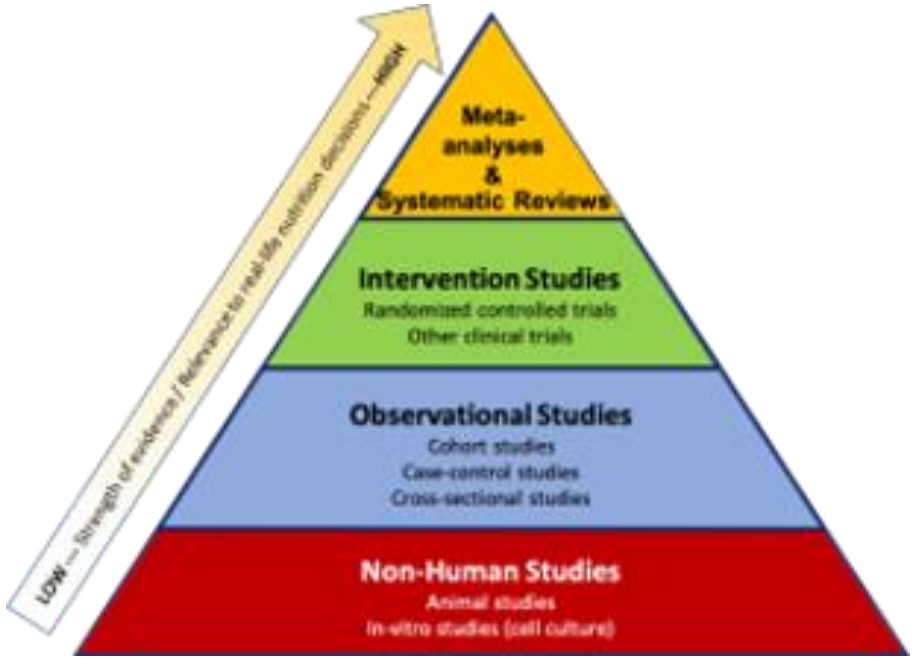
Children's Mercy
KANSAS CITY

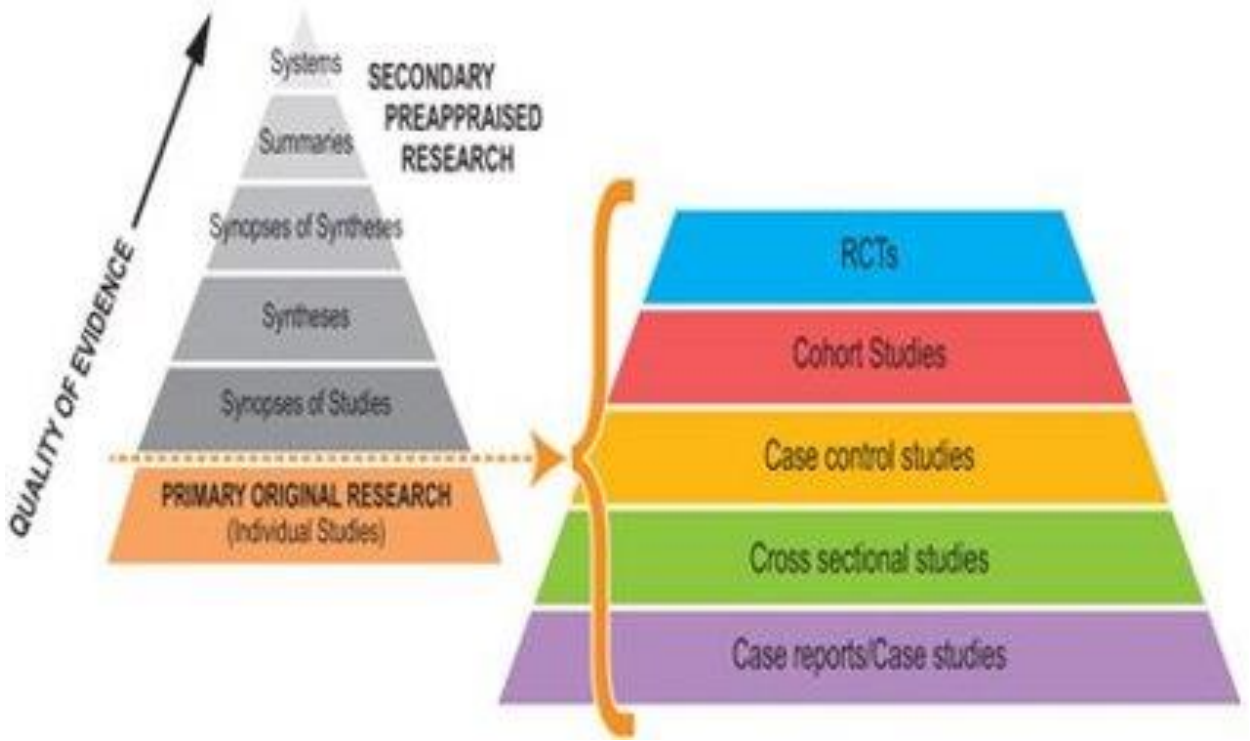
By the end of this presentation, you will:

- Understand how to read an article
- Use information from the Methods and Results sections to determine the relevance and effectiveness of an intervention
- Realize the tools available to assist in conducting a rapid systematic review
- Recognize and understand how to read a forest plot
- Gain the ability and importance of evaluating the certainty of the evidence

Research Overview: Types of Literature

Types of Research and Quality





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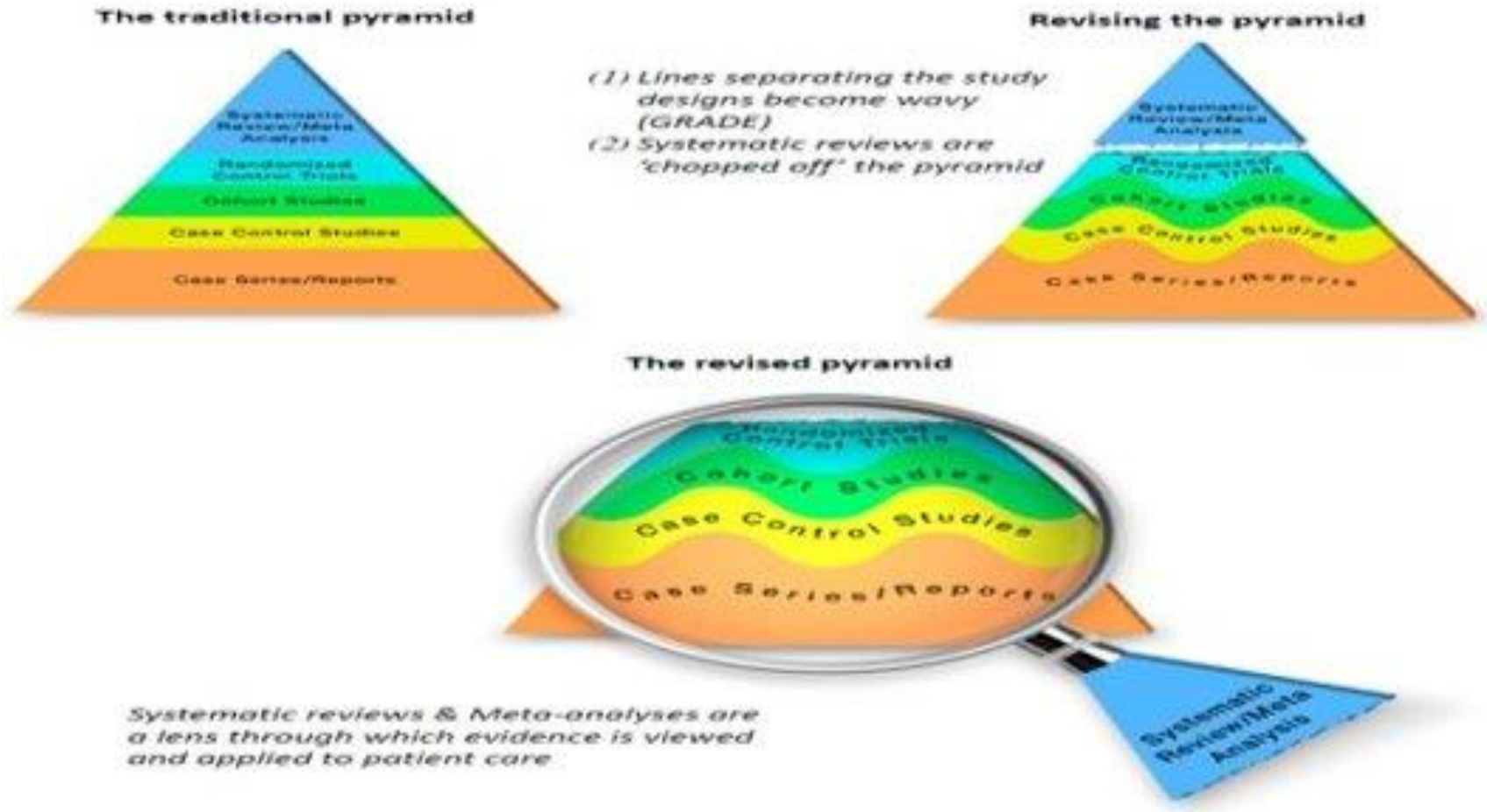
The New Evidence Pyramid



Types of Studies

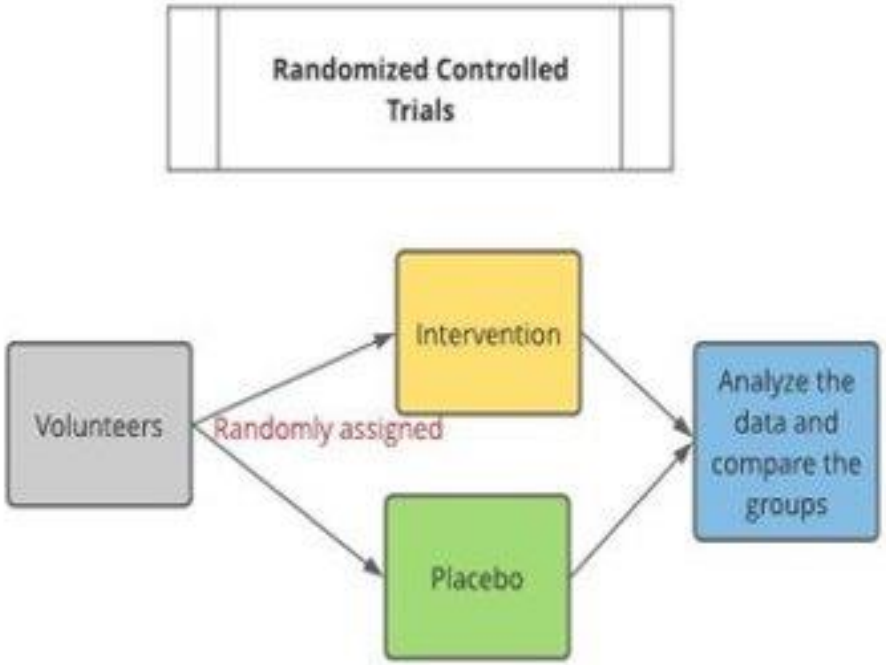
Let’s Talk About Study Design

Types of Studies

- Randomized Controlled Trials (RCT)
- Non-Randomized Clinical Trials
- Cohort Studies
- Case Control Studies
- Cross-Sectional Studies
- Case Reports
- Systematic Review
- Meta-Analysis

Observational Studies

Randomized Controlled Trial (RCT)



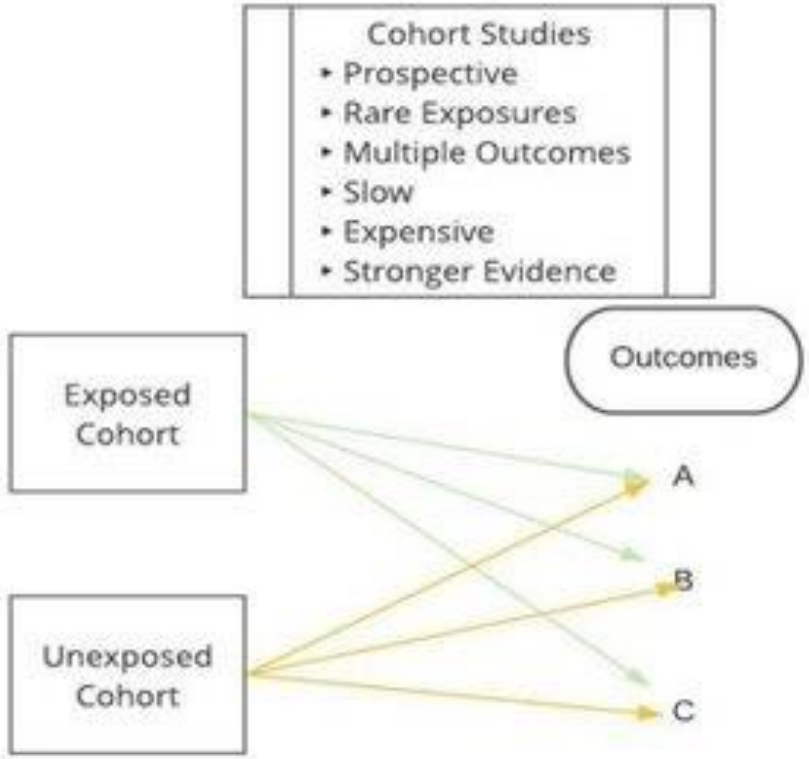
- Participants are randomly assigned into one of two groups:
  - An experimental group
  - A control group or comparator group
- Outcome variable being studied should be the only expected difference between groups

RCT Design Pitfalls

- A RCT should be a study of one population
  - *Was the randomization truly "random", or are there really two populations being studied?*
- The variables being studied should be the only variables between the experimental group and the control group
  - *Are there any confounding variables between the groups?*

Cohort Studies

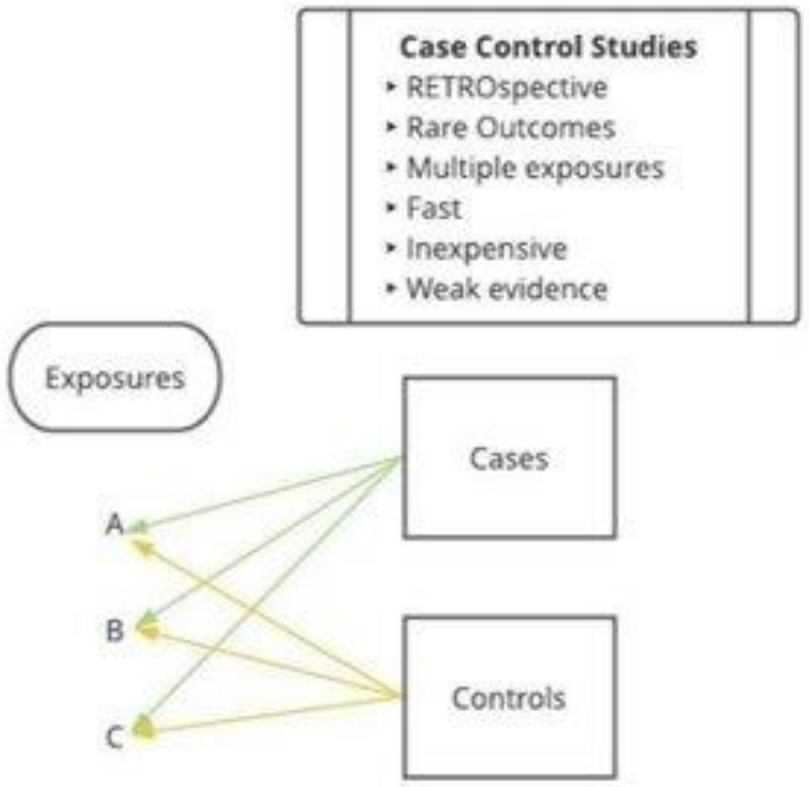
- One or more samples (cohorts) are followed.
- Studies can be:
  - Prospective
  - Retrospective
- Status evaluations completed to determine participant exposure characteristics/risk factors
- Outcome measured to determine relationships with specific characteristics



Cohort Studies: Design Pitfalls

- The cohorts need to be chosen from separate, though similar, populations
  - *How many differences are between the control cohort and the experiment cohort?*
  - *Will the differences potentially impact the study outcomes?*

Case Control Studies



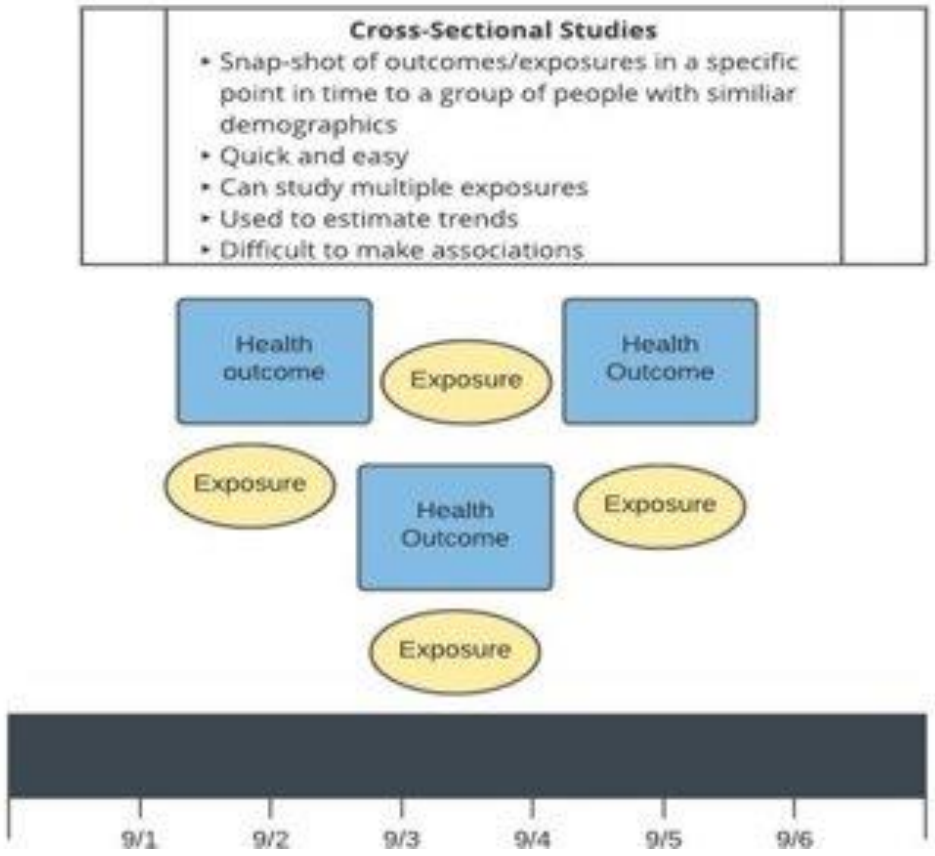
- Retrospective observational comparison
  - Participants who have a disease or outcome of interest (cases)
  - Participants who do not have the disease or outcome of interest (controls)
- Compares how frequently the exposure to a risk factor is present in each group
- Determines relationship between the risk factor and the disease (odds ratio)

Case Control Studies: Design Pitfalls

- Care should be taken to avoid confounding, which rises when an exposure and an outcome are both strongly associated with a third variable
- Controls should be participants who might have been cases in the study, though selected independent of the exposure
- Cases and controls should not be "over-matched"
  - *Is the control group appropriate for the population?*
  - *Does the study use matching or pairing appropriately to avoid the effects of a confounding variable?*
  - *Does the study use appropriate inclusion and exclusion criteria?*

Cross-Sectional Studies

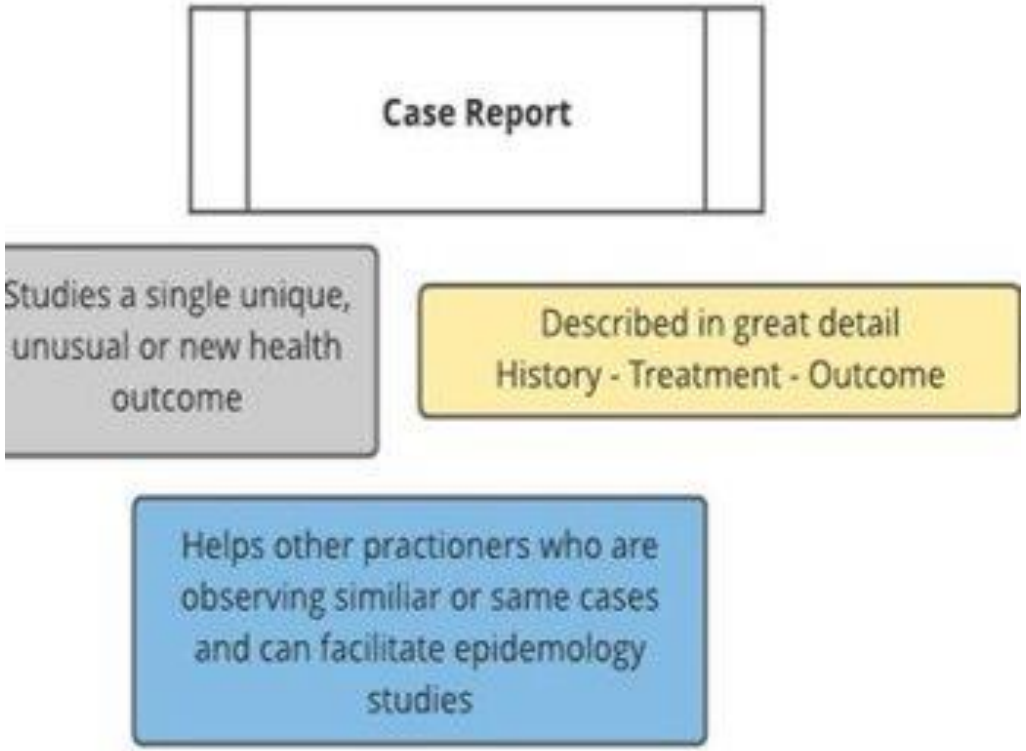
- Observational study that analyzes data from a population, or a representative subset
- Considers a specific point in time
- Cross-sectional design is used to:
  - Measure health outcomes
  - Understand the determinants of health
  - Describe features of a population



Cross-Sectional Studies: Design Pitfalls

- Care should be taken to avoid confounding, which rises when the exposure and an outcome are both strongly associated with a third variable
- Finding a large enough number of participants that have the variable of interest may be challenging (potential for selection bias)
  - *Is the outcome and the exposure being examined occurring simultaneously?*
  - *How were the participants selected?*
  - *Does the study use appropriate inclusion and exclusion criteria?*

Case Reports



- An article that details and interprets an individual case
- Case reports often describe:
  - Unique cases
  - Cases that show variation of a disease or condition
  - Cases that demonstrate unexpected events
  - Cases in which one patient has two or more unexpected diseases or disorders

Case Reports: Design Pitfalls

- The patient should be described in detail, allowing others to identify patients with similar characteristics
  - *Does the case report provide information about the patient's age, sex, ethnicity, race, employment status, social situation, medical history, diagnosis, prognosis, previous treatments, past and current diagnostic test results, medications, psychological tests, clinical and functional assessments, and current intervention?*
- Case reports should include carefully recorded, unbiased observation
  - *Does the case report include measurements and/or recorded observations of the case? Does it show a bias?*

Case Reports: Design Pitfalls

- Case reports should explore and infer, not confirm, deduce, or prove. They cannot demonstrate causality or argue for the adoption of a new treatment approach
  - *Does the case report present a hypothesis that can be confirmed by another type of study?*

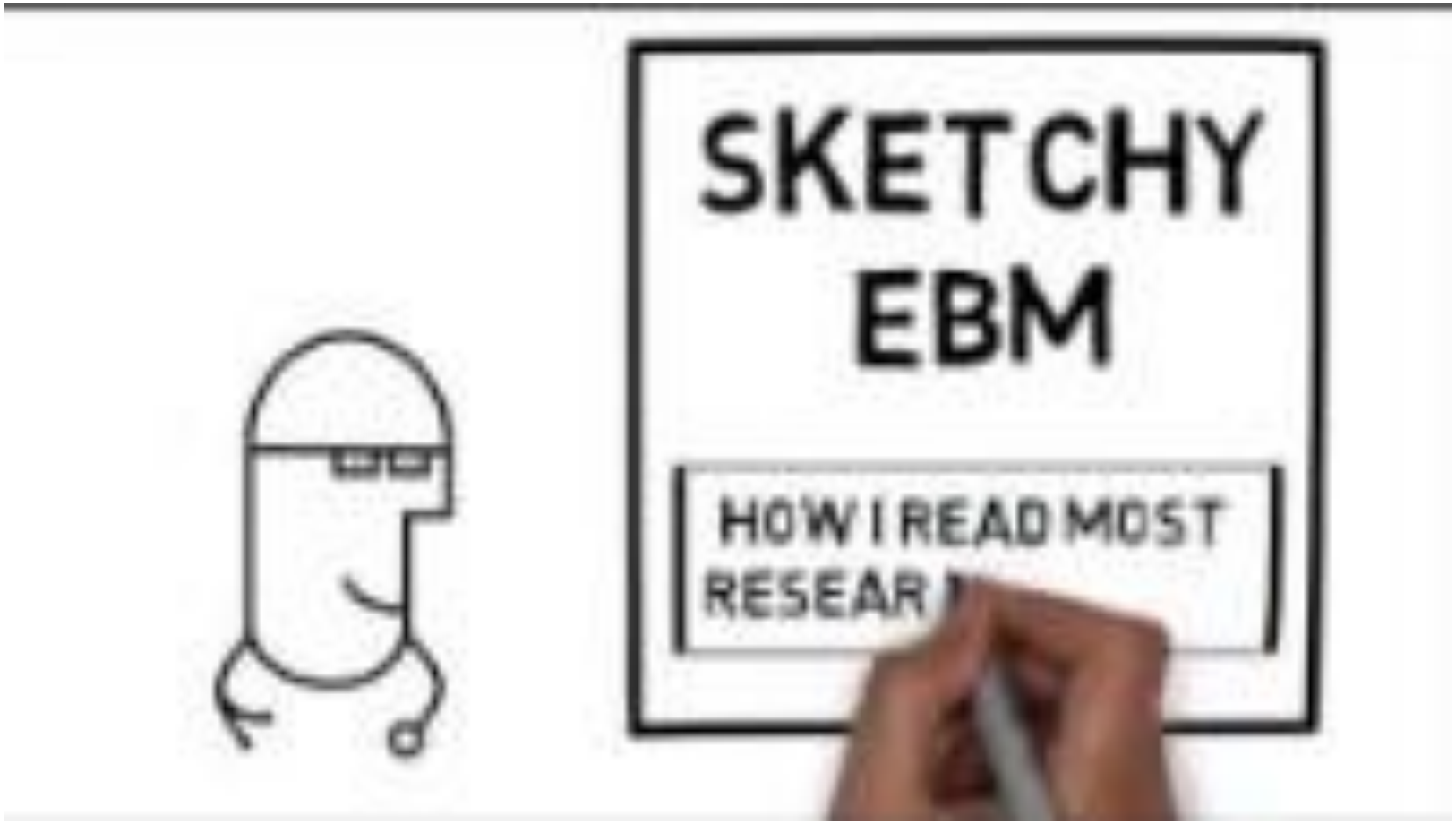
Systematic Review

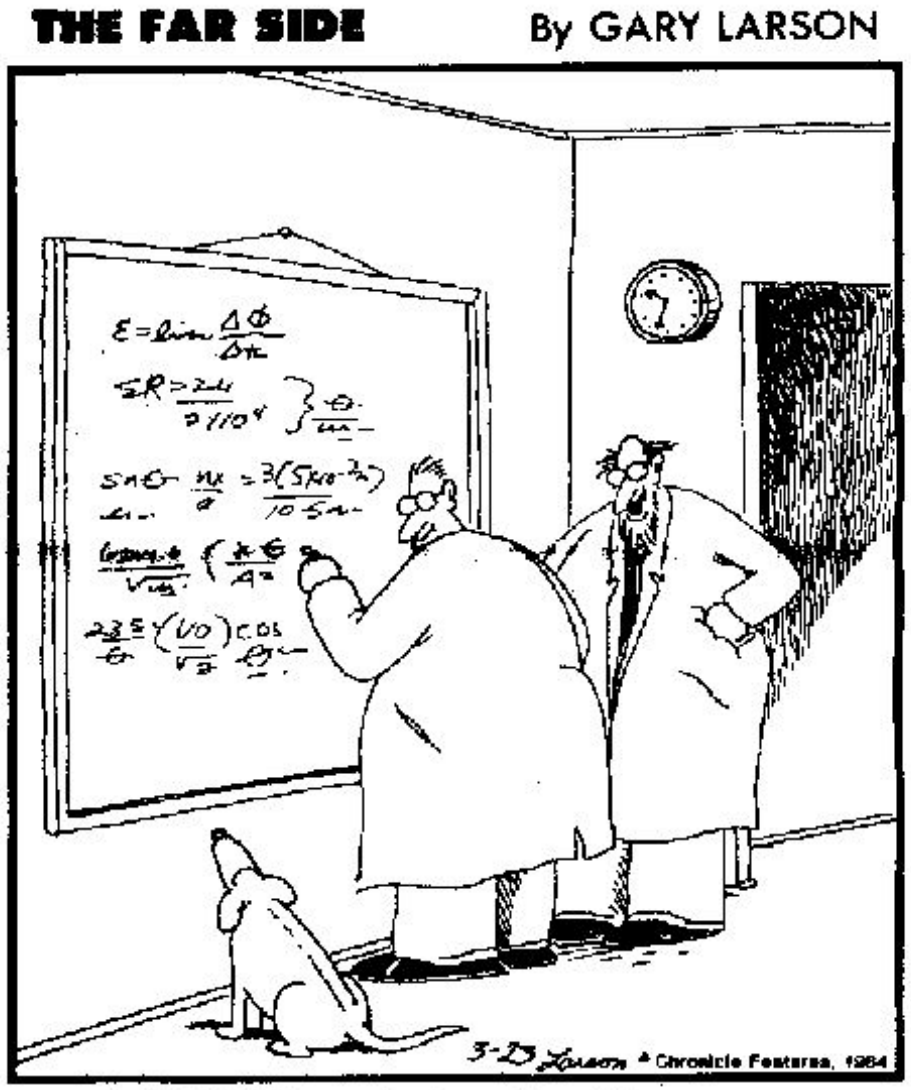
- A summary of the clinical literature
- A critical assessment and evaluation of all research studies that address a particular clinical issue
- Organized method of locating, assembling, and evaluating a body of literature using a set of specific criteria
- Typically includes a description of the findings of the collection of research studies

Meta-Analysis

- A work consisting of studies using a quantitative method of combining the results of independent studies and synthesizing summaries and conclusions
- It is often an overview of clinical trials

How to Read an Article





"Ohhhhhhh . . . Look at that, Schuster . . .
Dogs are so cute when they try to comprehend
quantum mechanics."

How to Interpret Data in an Article

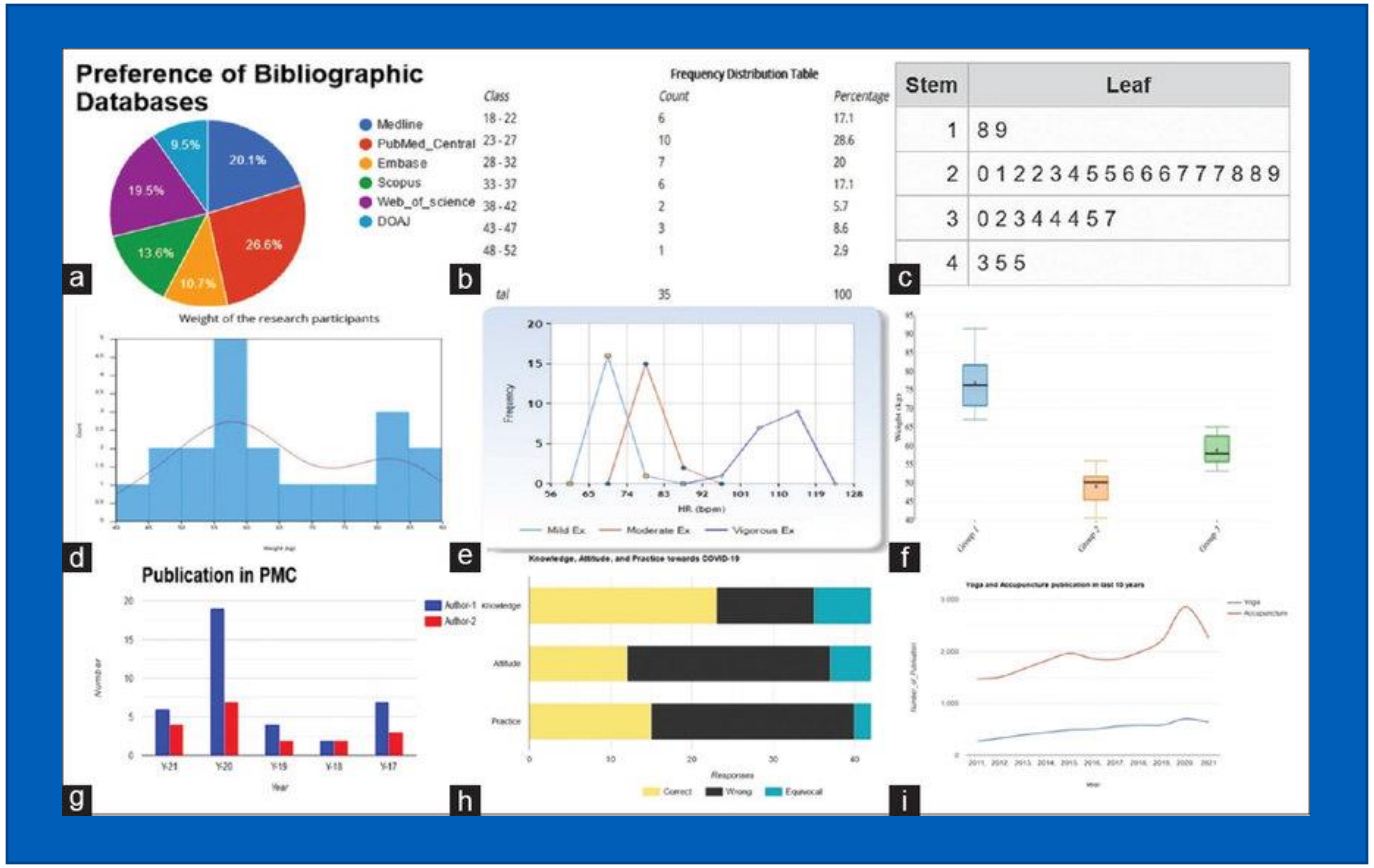
- Graphs
- Tables
- Confidence intervals
- Forest plots

Interpreting Data

- Data can be displayed in numerous ways
- Interpreting the data is vital to understanding the content of an article
- When interpreting the data, keep these questions in mind:
  - Is there a trend in the data?
  - Is there a key, legend, or other descriptions available? (*If so, what do they say about the data?)*
  - Why is the data presented in the _____ format? (*Could the data be presented more effectively?*)
  - What conclusions can be made from the data?

Graphs

- Illustrate the relationships between variables in the study



(a) pie chart, **(b)** frequency table, **(c)** stem and leaf display, **(d)** histogram, **(e)** frequency polygon, **(f)** box plot, **(g)** bar chart, **(h)** stacked bar chart, and **(i)** line graph.

Tables

- Used to communicate results which may be too detailed or complicated to adequately describe in text

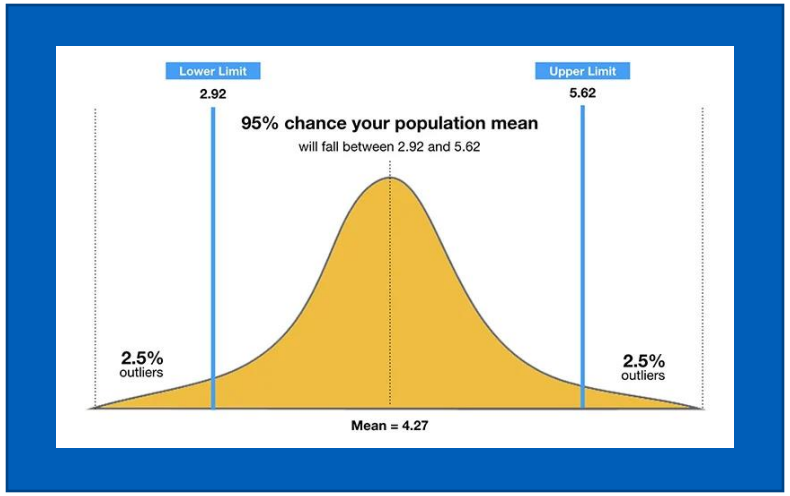
Table 2. *Results of the exams in the cardiovascular system module*

	Problem-Solving Exam				Multiple-Choice Exam			
	n	Mean	SD	*P* Value	*n*	Mean	SD	*P* Value
Control group	39	2.79	1.39	0.0013	39	3.52	3.52	0.098
Intervention group	83	3.60	1.18		83	3.80	3.80	

n, Number of students per group. *P* values were determined by a nonpaired Student's *t*-test for homogenous variance. Results were also determined using the Mann-Whitney test.

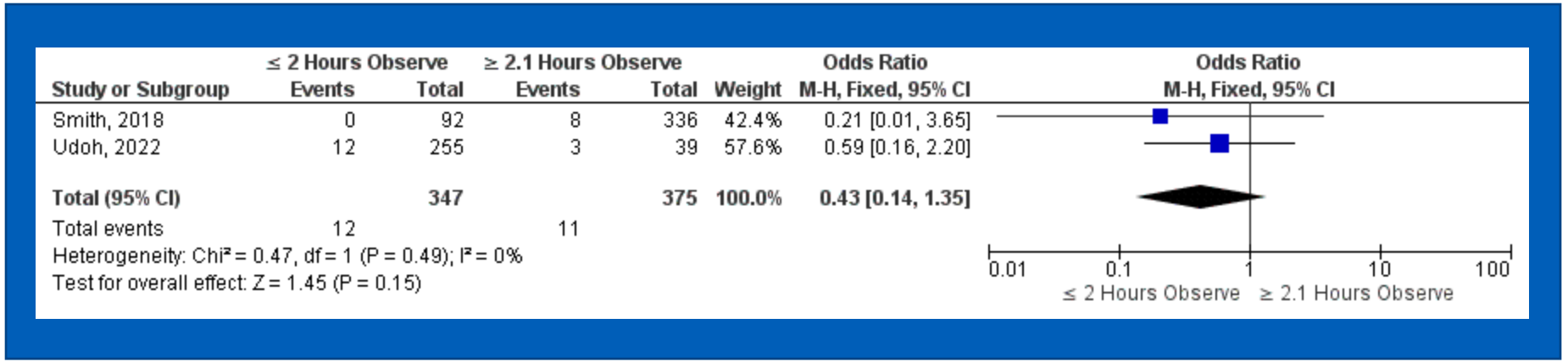
Confidence Intervals (CI)

- Indicates a population's parameters
- Provides the level of certainty or uncertainty for an estimate of effect (*difference between variables*)
- The narrower the CI, the more precise the estimate of effect; conversely the wider the CI, the less precise the estimate of effect
- Sample size influences CI (*the larger the size, the narrower the CI*)



Forest Plots

- A graphic representation of the findings from multiple studies
- Represents findings for likened comparisons on a single outcome



Study or Subgroup	≤ 2 Hours Observe Events	Total	≥ 2.1 Hours Observe Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI
Smith, 2018	0	92	8	336	42.4%	0.21 [0.01, 3.65]
Udoh, 2022	12	255	3	39	57.6%	0.59 [0.16, 2.20]
Total (95% CI)		**347**		**375**	**100.0%**	**0.43 [0.14, 1.35]**
Total events	12		11			

Heterogeneity: Chi² = 0.47, df = 1 (P = 0.49); I² = 0%
Test for overall effect: Z = 1.45 (P = 0.15)

Practice

Scand J Work Environ Health 2015;41(2):153-163
https://doi.org/10.5271/sjweh.3479
Published online: 18 Jan 2015, Issue date: 01 Mar 2015

Effect of workplace- versus home-based physical exercise on musculoskeletal pain among healthcare workers: a cluster randomized controlled trial

by Jakobsen MD, Sundstrup E, Brandt M, Jay K, Aagaard P, Andersen LL

Physical exercise at work together with colleagues is more effective than home-based exercise in reducing musculoskeletal pain and use of analgesics among female healthcare workers.

Affiliation: National Research Centre for the Working Environment, Lersø Parkalle 105, Copenhagen, Denmark. markusdue@gmail.dk

Refers to the following texts of the Journal: 2014;40(1):74-81 2012;38(2):183-184 2012;38(2):182 2011;37(3):196-203 2008;34(1):55-65

The following articles refer to this text: 2016;42(6):510-519; 2018;44(2):134-146; 2018;44(6):568-584; 2020;46(1):1-4

Key terms: back pain; cluster randomized controlled trial; healthcare; healthcare worker; MSD; musculoskeletal disorder; musculoskeletal pain; neck pain; occupational health; occupational health; physical exercise; randomized controlled trial; shoulder pain; strength training; workplace

This article in PubMed: www.ncbi.nlm.nih.gov/pubmed/25596848

LastNameFirstAuthor (YYYY)

Methods	Randomized Control Trial
Participants	**Participants:** **Setting:** **Randomized into study:** *N* = • **Group 1, Insert intervention*:** *n* = • **Group 2, Insert intervention:** *n* = • **Group 3, Insert intervention:** *n* = • **Group 4, Insert intervention:** *n* = *Use generic med names (delete) **Completed Study:** *N* = • **Group 1:** *n* = • **Group 2:** *n* = • **Group 3:** *n* = • **Group 4:** *n* = **Gender, males (as defined by researchers):** • **Group 1:** *n* = ___(%) • **Group 2:** *n* = ___(%) • **Group 3:** *n* = ___(%) • **Group 4:** *n* = ___(%) **Race / ethnicity or nationality (as defined by researchers):** • See table **Age, mean/median in months/years, (range/IQR** if not reported, delete this parenthetical note) • **Group 1:** • **Group 2:** • **Group 3:** • **Group 4:** **Inclusion Criteria:** • **Exclusion Criteria:** • **Power Analysis:** (if not reported, insert "Not reported")
Interventions	*If the same thing happened to all groups note it under Both, if not delete. *Paraphrase (delete) **Both:** • **Group 1:** • **Group 2:** • **Group 3:** • **Group 4:**
Outcomes	Results do NOT go here. (delete)

AOTA Toolkit

Tools

- AOTA Journal Club Guide - https://www.aota.org/practice/practice-essentials/evidencebased-practiceknowledge-translation/kt-toolkit-journal-club-guide
- Joanna Briggs Institute (JBISUMARI) - https://jbi.global/critical-appraisal-tools
- Covidence - https://www.covidence.org/
- Zotero - https://www.zotero.org/
- EndNote - https://endnote.com/

Have we helped you…

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Questions?

References

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