Systematic Review

An update on NIOSH Activities

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The findings and conclusions in this report are those of the author(s) and do not necessarily represent the views of the National Institute for Occupational Safety and Health

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Mission

To become more informed about the systematic review processes being used by CDC and other Federal agencies

To evaluate and improve NIOSH guidance development process to assess whether refinements or additions are needed

To examine the feasibility of adopting or adapting existing approaches of systematic reviews and grading evidence

Working Definition

Systematic review methods are explicit and transparent methods to critically appraise a body of literature.

Examples of Systematic Review Methodologies

- National Toxicology Program, Office of Health Assessment and Translation
- Cochrane Database of Systematic Reviews
- US Preventive Task Force Services Guidelines
- The Guide to Community Preventive Service
- Grading of Recommendations Assessment, Development and Evaluation

Why conduct a systematic review?

Quality	Trend	Risk
• Transparency • Consistency • Reduce bias • Validity • Reliability • Confidence	• Academia • Government • International Consortia • Professional Society • Industry	• Reputation • Leadership • Loss of value or utility

Six Basic Elements

Define the question	• Define the question(s) to be evaluated.
Create a review protocol	• Develop a systematic review protocol, or use a template from published method, to describe the systematic review process that will be used.
Conduct a literature review	• Identify and select relevant studies using pre-defined search terms and inclusion/exclusion criteria.
Evaluate individual studies	• Conduct detailed quality analysis of individual studies and extract data using pre-defined evaluation criteria.
Integrate and interpret data	• Integrate and interpret evidence across studies and across lines of evidence.
Develop a report	• Make conclusions about a body of evidence, develop recommendations, and produce a report.

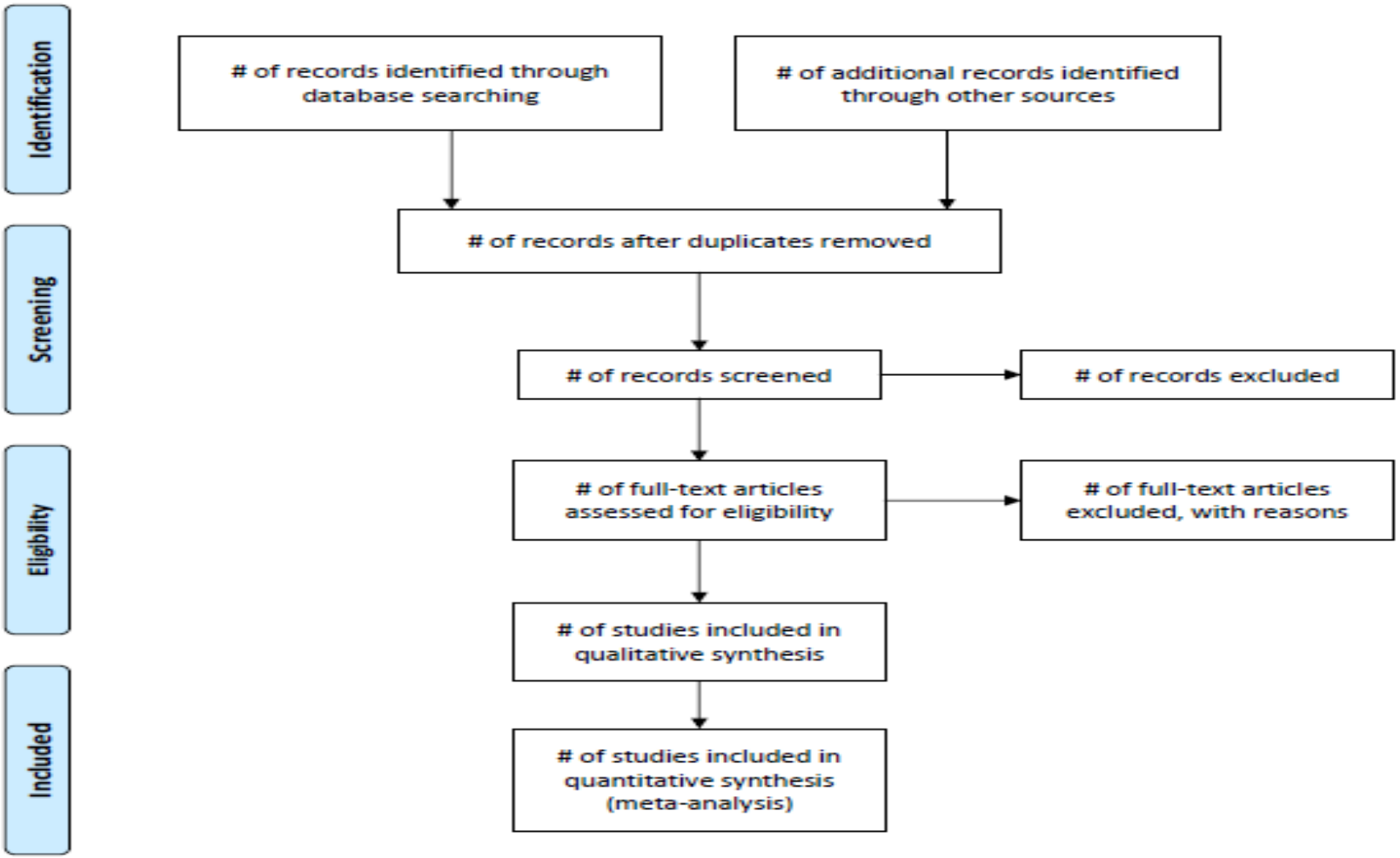
Formulate a Question

- Questions should be specific
- Population covered
- Definitions
  - Exposures
  - Health effects
  - Interventions
- Workplace setting, processes, PPE
- Recognize limitations

Create a Review Protocol

- Databases for information
- Selection and exclusion criteria
- Appraisal and integration criteria
- Opportunities for peer, stakeholder and public engagement

Identify and Select Information



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *Preferred Reporting Items for Systematic Reviews and Meta-Analyses*: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

Appraising Individual Studies

Study design & methodological rigor

Relevance to question

Appropriateness of study population

Unexplained inconsistency

Confounders

External validity

Strengths and limitations

Magnitude & direction of effect, statistical power, imprecision

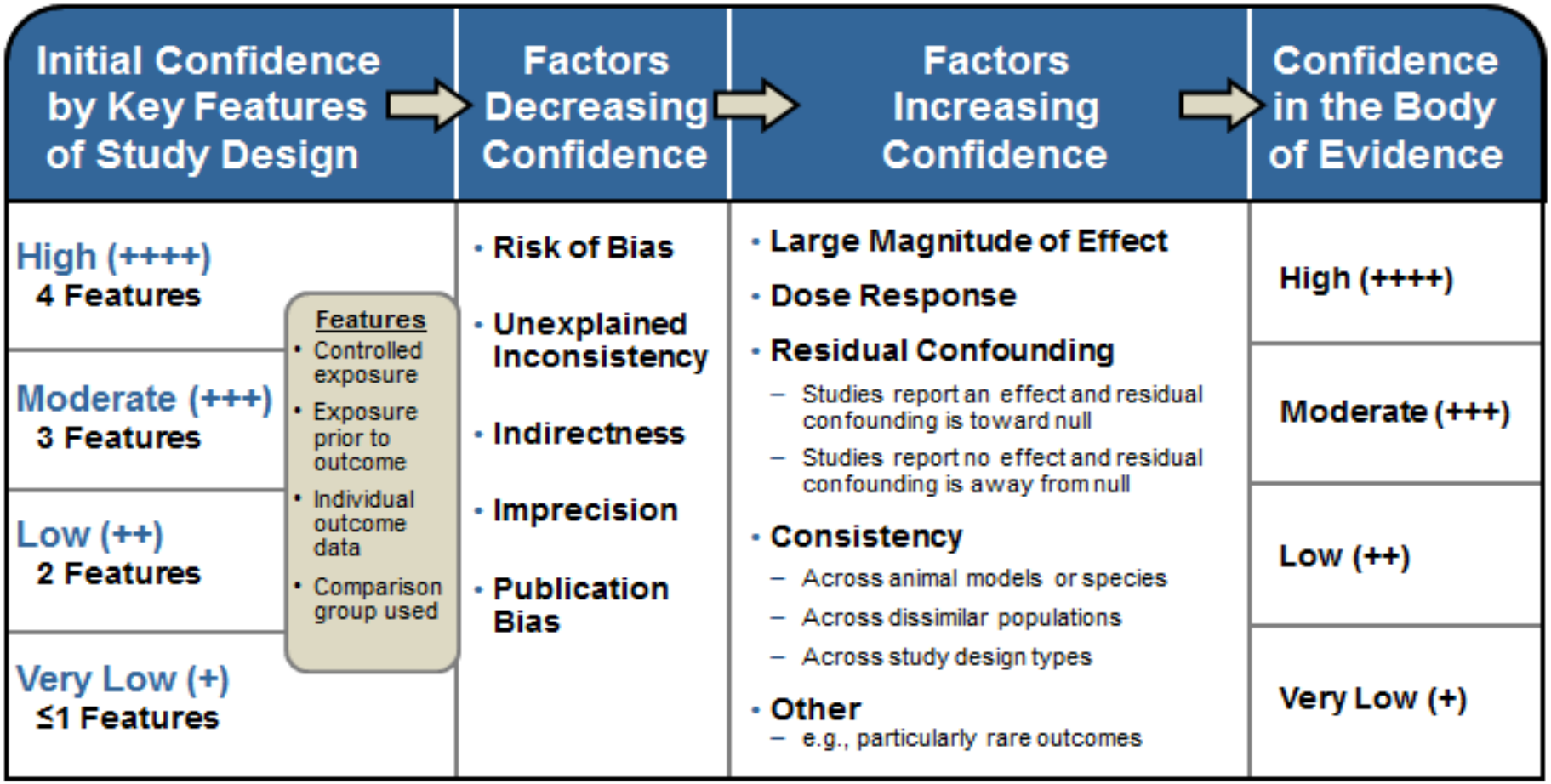
Potential for bias

Integrating Evidence

- Describe the number, quality, size, strengths and weaknesses, and other factors of the included information.
- Describe direction and consistency of effect across studies.
- Describe patterns of strengths and limitations across studies, including bias.
- Describe streams of evidence that are logically or mechanistically connected.
- Identify and describe which studies were most heavily relied on for making influential determinations.

Example of NTP/OHAT Grading System

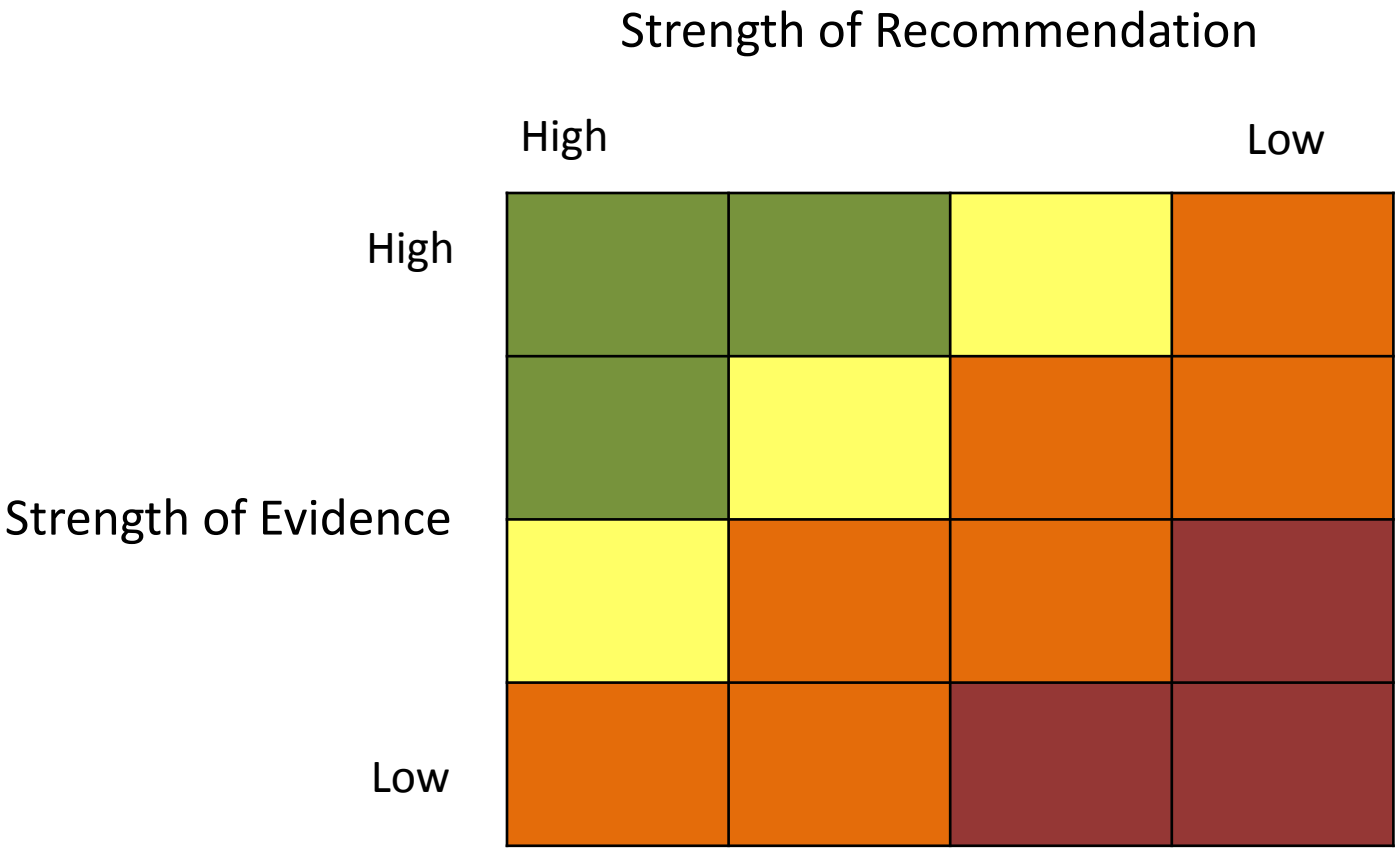
Step 5. Assessing Confidence in the Body of Evidence



NTP/OHAT
Level of confidence in the body of evidence

High Confidence (++++)	in the association between exposure to the substance and the outcome. The true effect is highly likely to be reflected in the apparent relationship.
Moderate Confidence (+++)	in the association between exposure to the substance and the outcome. The true effect may be reflected in the apparent relationship.
Low Confidence (++)	in the association between exposure to the substance and the outcome. The true effect may be different from the apparent relationship.
Very Low Confidence (+)	in the association between exposure to the substance and the outcome. The true effect is highly likely to be different from the apparent relationship.

Develop a Report



Rationale for Grading/Rating

GRADE	Make well informed decisions for healthcare
Community Guide	Determine whether an intervention is “recommended” or “recommended against”
NTP/OHAT	rate confidence in the body of evidence, which is translated to level of confidence for health effect
USPSTF	understand the Task Force’s judgment about the certainty of the evidence, the net benefit of implementation, and the overall recommendation about the use of each preventive service.

What we learned

- Systematic review is consistent with core principles of NIOSH guidance development (advances mission, based on best available evidence, developed transparently).
- NIOSH is already engaged in full-scale or partial-scale systematic reviews.
- There is not one preferred methodology for all of NIOSH – the NIOSH framework or a published system may be used.
- Not all NIOSH publications require systematic review.

Moving forward

- Use systematic review for critically appraising scientific literature
- Scale the method and resources to the question
- Provide an explicit description of the literature review and evidence base (selection criteria)
- Link recommendations to the evidence base using clear language

Current Efforts

- Work group is further studying evidence integration and evidence rating/grading
- Current objective is to evaluate options for adopting, adapting, or developing an evidence rating system for NIOSH assessments.

Discussion

- How do you use information from systematic reviews?
- How might you use information from a system that grades or rates information?
- What would a graded recommendation mean in the context of implementation in the workplace?
- How might you use narrative text or certain code words within guidance, such as “recommend”, “should”, “consider”, “suggest”, etc.?

References

- Cochrane Database of Systematic Reviews (see http://www.cochranelibrary.com/cochrane-database-of-systematic-reviews/index.html)
- National Guideline Clearinghouse (see http://www.guideline.gov/)
- National Toxicology Program, Office of Health Assessment and Translation (see https://ntp.niehs.nih.gov/pubhealth/hat/noms/index-2.html#Systematic-Review-Methods)
- The Community Guide to Preventive Services (see http://www.thecommunityguide.org/)
- US Preventive Services Task Force (see http://www.uspreventiveservicestaskforce.org/Page/Name/home)

Final Questions or Comments