Systematic Use of Evidence to Address Public Health Questions

Randy Elder
Scientific Director for Systematic Reviews
Community Guide Branch
Disclaimer

The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

The Centers for Disease Control and Prevention provides administrative, research, and technical support for the Community Preventive Services Task Force.
“It is the mark of an educated man to look for precision in each class of things just so far as the nature of the subject admits”

Aristotle, c. 350 BC
Why Use an Evidence-Based Approach?

It’s the responsible thing to do

- Maximizes ability to effectively and efficiently use resources

It’s the smart thing to do

- Improves ability to justify allocation of scarce resources to address important problems
  - Addressing public health needs
  - Filling evidence gaps
Benefits of Basing Guidelines on Systematic Research Synthesis

- **Reliability**
  - Move us beyond selective use of scientific evidence

- **Transparency**
  - Reduce bias
  - Make assumptions and procedures clear

- **Synthesis**
  - Streamline enormous amounts of data
  - Reconcile or explain variable results
- Product of an independent US Task Force: **Community Preventive Services Task Force**
- A focus on population-based interventions in:
  - Communities
  - Health care and public health systems
- Evidence-based conclusions and recommendations regarding use

* [www.thecommunityguide.org](http://www.thecommunityguide.org)
What Do Public Health Interventions Look Like?

- Programs, services, and policies
  - Often implemented opportunistically to address perceived needs, considering available resources
  - Seldom permit random allocation to intervention and control conditions

- Usually more “complex” than clinical interventions
  - Multiple facets that vary across locations
  - Often adapted to meet local needs and resources
  - Rarely implemented in isolation—several potential confounding factors to consider
  - Results may depend on context

- Potential for substantial health impact at a modest cost
Quality of Evidence is Not Uniform Across Interventions and Questions

• Highest-quality evidence for:
  • Clinical treatment
  • Individually-oriented approaches
  • Simple interventions
  • Short-term interventions
  • Main effects (vs. interactions)
• Need to avoid the “drunk at the lamppost” problem
Issues Considered in Community Guide Reviews

- Barriers
- Economic Information

Intervention → Intended Outcomes → Morbidity and/or Mortality

Additional Outcomes → Benefits

Harms

Applicability of the evidence
Traditional Methods are Adapted to Meet Community Guide Goals and Subject Matter

- A rigorous, systematic approach to gathering and synthesizing evidence

- Consideration of all relevant sources of information
  - Practice-based evidence (i.e., non-randomized studies of real-world interventions) is a cornerstone of most Community Guide reviews
  - Key criterion for inclusion of a study is whether it is informative, not whether it provides a perfect effect estimate

- Answering all relevant questions to the extent the data will support
  - Developed specific methods for providing the best possible guidance on applicability and implementation issues, despite evidence limitations
Complementarity Between Clinical and Community Preventive Services

Task Force Focus and Review Questions

CPSTF (Community Guide)

What are important population-based interventions to increase receipt of this effective clinical interaction?

USPSTF (Clinical Guide)

Is this Provider-Patient Interaction Effective?
(screening, screening and counseling, preventive treatment)

Are these interventions effective?

Policy Interventions

Provider Interventions

Client Interventions

Effective Provider-Patient Preventive Interaction

Reduced Morbidity & Mortality
Conceptualizing the Questions of Interest

1. Refine the definition of the intervention, considering the appropriate level of breadth

2. Consider the expected causal pathway for the intervention’s effect on public health

3. Consider contextual variables or effect modifiers of interest for abstraction
Identifying Questions of Potential Interest

Possible Interventions
- Guidelines
- Information Dissemination
- Policies

Provider Counseling

Use of Nutritional Supplementation to Prevent Macular Degeneration

Client Awareness, Motivation, and Ability to Change Behavior

Other Benefits and Harms

Reduced Incidence and Severity of Blindness

Reduced Macular Degeneration
Common Effect Modifiers of Interest Include...

- Population characteristics (e.g., demographic data; risk status)
- Characteristics of the intervention (e.g., intensity)
- Characteristics of the study (e.g., design)
- Environmental characteristics (e.g., urban vs. rural)
- Other contextual information (e.g., baseline rates of a condition)
Rationale for Including a Range of Study Designs in Community Guide Reviews

- Generalizability

- Power
  - Increases potential to provide useful guidance on “lumped” effects
  - Dramatically increases potential to provide useful guidance on effect modification issues

- Potential biases can be assessed
  - Empirically
  - By considering systematic sources of bias that may affect a specific study design
  - Using triangulation
Effectiveness of Ignition Interlocks

Author, Year

- Bjerre, 2005
- DeYoung, 2005
- Morse, 1992
- Roth, 2007
- Voas, 1999
- Tippett, 1998
- Vezina, 2002
- EMT Group, 1990
- Roth, 2006
- DeYoung, 2005
- Marine, 2000
- Voas, 1999
- Tippetts, 1998
- Vezina, 2002
- Raub, 2003
- Popkin, 1993
- Jones, 1993
- EMT Group, 1990
- Voas, 2002
- Voas, 2002
- Beck, 1999

Net percent change in re-arrest rates

- First offenders
- Repeat offenders
- All participants

Median: -67%
IQI: -82%, -50%
Task Force Recommendation Options

- **Recommend**
  - Strong Evidence
  - Sufficient Evidence

- **Recommend against**
  - Strong Evidence
  - Sufficient Evidence

- **Insufficient evidence to recommend for or against**
In General, a Conclusion on Effectiveness Requires....

A Body of Evidence
- More than one study
- Fewer if high quality
- More if lower quality

A Demonstration of Effectiveness

Consistency of Effect
- "Most" studies demonstrated an effect in the direction of the intervention

Sufficient Magnitude of Effect
- The effect demonstrated across the body of evidence is "meaningful"
<table>
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<tr>
<th>Evidence of Effectiveness</th>
<th>Quality of Execution</th>
<th>Suitability Of Design</th>
<th>Number of Studies</th>
<th>Consistent</th>
<th>Effect Size</th>
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<tr>
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<td>Meet criteria for STRONG body of evidence, but Task Force opts to downgrade conclusion to SUFFICIENT for one or more reasons</td>
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<td><strong>Expert Opinion</strong></td>
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<td>Meaningful</td>
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<tr>
<td><strong>INSUFFICIENT (one or more)</strong></td>
<td>Inadequate designs or execution</td>
<td>Too Few</td>
<td>No</td>
<td>Small</td>
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Steps Following Task Force Finding

Economics Review
- Conduct systematic review of economic evidence (for Recommended interventions)

Dissemination of Results
- Draft and ratify Task Force Finding and Rationale Statement
- Draft review results and evidence gaps
  - Website summaries
  - Papers for publication
Thank You!

Randy Elder
rfe3@cdc.gov

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