What Difference Are You Making?

“Discover the impact our work has on the health of the nation and the world”

IOM home page

Harvey Fineberg, MD, PhD
President, Institute of Medicine

Accessible Version: https://youtu.be/EDxBT7lI8Oc
How CDC is Making a Difference
Science Impact Framework

Mary D. Ari, PhD
Senior Health Scientist
Office of the Associate Director for Science, CDC
Why We Do What We Do

Health—a fundamental resource for *unencumbered* and *joyful* living

By protecting health, CDC’s ultimate *raison d’etre* is to enable people to achieve their full potential in both their *personal* and *professional* lives
What Is the Impact of Our Work?
State of the Art in Measuring Impact of Research

- Relying solely on bibliometrics is a dated approach
- Broader societal, environmental, cultural, and economic value must be taken into consideration
- Best practice combines
  - Narrative
  - Quantitative indicators
  - Qualitative Indicators
What IS the Idea?
It Is a Framework

- A framework for tracking CDC science and linking its influence or impact on subsequent events and actions that ultimately lead to improving health
  - Based on (with permission) the Institute of Medicine (IOM) Degrees of Impact Framework
  - Other frameworks considered

- Developed in January–June 2012 by a small OADS-led workgroup

Rukmani, R. Current Science 2008;95(12):1694-8
“Discover the **impact** our work has on the health of the nation and the world”

IOM home page
CDC Science Impact Framework
5 Levels of Scientific Influence

- Creating Awareness
- Effecting Change
- Disseminating Science
- Catalyzing Action
- Shaping the Future

Morbidity and mortality
Health and well being
CDC Science Impact Framework

- Scientific publications
- Professional meetings and conferences
- General communication (social media, web, print)

Disseminating Science
Creating Awareness
Catalyzing Action
Effecting Change
Shaping the Future

Morbidity and mortality
Health and well being
CDC Science Impact Framework

- Awards
- Information sharing among professional societies
- Dialogue in scientific community

Creating Awareness

Disseminating Science

Catalyzing Action

Effecting Change

Shaping the Future

Morbidity and mortality

Health and well being
CDC Science Impact Framework

- Public health capacity building
- Practice and policy changes
- Cultural, economic, social, and behavioral changes

Disseminating Science
Catalyzing Action

Effecting Change

Shaping the Future

Morbidity and mortality
Health and well being
CDC Science Impact Framework

- New hypotheses
- Public health programs/initiatives
- Continuous quality improvement
- Health outcomes

Morbidity and mortality

Health and well being
CDC Science Impact Framework

Disseminating Science
Creating Awareness
Catalyzing Action
Effecting Change
Shaping the Future

Morbidity and mortality
Health and well being
Proposed Framework with 5 Levels of Influence

- Disseminating Science
- Creating Awareness
- Catalyzing Action
- Effecting Change
- Shaping the Future
How We Tested the Framework
9 Case Studies

- **Case studies were selected from**
  - CDC Public Health Grand Rounds (4)
  - Shepard Science Award-winning manuscripts (4)
  - MMWR articles (1)

- **Case studies covered broad areas of epidemiology and laboratory research**

- **For each case study, workgroup members**
  - Identified events related to the original manuscripts
  - Placed manuscripts within 1 of the 5 levels of influence
  - Researched in more detail the influence in these events
  - Validated the events and the links with the program subject-matter expert
Principles

- Linking of events prospectively or retrospectively
  - Contributors
  - Contributions
  - Correct assignment of credit
  - Focus on re-use

- Short-term indicators that predict long-term impact
  - Indicators
  - System for tracking these indicators

# Implementation Options

## Data Sources for Links and Associations

<table>
<thead>
<tr>
<th>Influence</th>
<th>Data Sources*</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disseminating Science</td>
<td>Investigators, MEDLINE, WoS, Google</td>
<td>CDC-authored scientific publications</td>
</tr>
<tr>
<td>Creating Awareness</td>
<td>Investigators, Lexis/Nexis, Web</td>
<td>FDA petition</td>
</tr>
<tr>
<td>Catalyzing Action</td>
<td>Investigators, registries (patents, trademarks), marketing, legislation</td>
<td>Safer labeling and marketing practices</td>
</tr>
<tr>
<td>Effecting Change</td>
<td>Investigators, surveillance systems, G&amp;R</td>
<td>ED visits reduced 50%</td>
</tr>
<tr>
<td>Shaping the Future</td>
<td>Investigators, surveillance systems, marketing, G&amp;R</td>
<td>“harm elimination”</td>
</tr>
</tbody>
</table>

*Data Sources are a mixture of stakeholders (who would be experts for identifying the data sources), systems (that can provide the data), and actual measures G&R, guidelines and recommendations*
Case Study
West Nile Virus (WNV)

- Disseminating Science
- Creating Awareness
- Shaping the Future
- Effecting Change
- Catalyzing Action

In 2001, CDC published an article in the *Journal of Virology* showing that a single dose of a DNA vaccine could prevent WNV infection in mice and horses.
Case Study
WNV Paper Metrics

Citations per Year

Quick Stats

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total citations</td>
<td>193</td>
</tr>
<tr>
<td>Second-generation citations</td>
<td>4,210</td>
</tr>
<tr>
<td>5-year impact factor</td>
<td>5.257</td>
</tr>
<tr>
<td>Average cites per year</td>
<td>16.17</td>
</tr>
</tbody>
</table>
Case Study
West Nile Virus (WNV)

Disseminating Science

Shaping the Future

Creating Awareness

Effecting Change

Catalyzing Action

- In 2002, the California Condor Recovery Team learned that an experimental CDC DNA WNV vaccine protected against WNV infection in several bird species
Case Study
West Nile Virus (WNV)

- Disseminating Science
- Creating Awareness
- Shaping the Future
- Effecting Change
- Catalyzing Action

- CDC expedited the delivery of the equine WNV vaccine
- In 2004, the vaccine was found to be safe and effective in protecting captive condors from naturally circulating WNV
Case Study
West Nile Virus (WNV)

- In 2005, the CDC equine DNA vaccine was licensed by the USDA.
- This led to a Phase 1 human clinical trial of a similar DNA vaccine.
- The vaccine was shown to induce T-cell and antibody responses at levels shown to be protective in studies of horses.
Case Study
West Nile Virus (WNV)

Disseminating Science

Shaping the Future

Creating Awareness

Effecting Change

Catalyzing Action

In 2008, the WNV team received the CDC Director’s Innovation Award
Case Study
West Nile Virus (WNV)

- In 2011, the NIH DNA vaccine was further modified
- It demonstrated an enhanced T-cell response in Phase 1 clinical trials
Science Impact Framework Webpage

http://www.cdc.gov/od/science/impact
CDC Discussion Panel

- **Tom Chapel**, MA, MBA
  Chief Evaluation Officer, Office of the Associate Director for Program

- **Christine Casey**, MD, CAPT, USPHS
  Deputy Editor, MMWR Serials
  Centers for Surveillance, Epidemiology and Laboratory Services

- **Rex Astles**, PhD
  Senior Health Scientist, Division of Laboratory Programs, Standards and Services, Centers for Surveillance, Epidemiology and Laboratory Services

- **Mehran Massoudi**, PhD, MPH, CAPT, USPHS
  Chief, Applied Research and Translation Branch
  Director, Prevention Research Centers Program
  National Center for Chronic Disease Prevention and Health Promotion

- **Lee Warner**, PhD, MPH
  Associate Director for Science, Division of Reproductive Health
  National Center for Chronic Disease Prevention and Health Promotion
June 2011 collaboration
- Office of the Associate Director for Science
- National Center for Injury Prevention and Control
- *Morbidity and Mortality Weekly Report (MMWR)*

Story-based framework

Alternative to journal metrics
- Biblio-, Sciento-, Webo-, Alt-, Entity-

Lessons learned

Next steps
- Explicit and intentional
- Educate and incorporate
- Evaluate and revise

Christine Casey, MD
CAPT, US Public Health Service
Deputy Editor, *MMWR Serials*
Center for Surveillance, Epidemiology, and Laboratory Services, CDC

Improving the Impact of Laboratory Practice Guidelines with Metrics

1. Identification of Gaps
2. Creation & Revision
3. Dissemination & Promotion
4. Collection of Data
   - Awareness
   - Adoption
   - Adaptation
   - Implementation
   - Impact

Data Collection & Analysis by Organization

Rex Astles, PhD
Senior Health Scientist, Division of Laboratory Programs, Standards, and Services Center for Surveillance, Epidemiology, and Laboratory Services, CDC
Measuring Public Health Impact in the Prevention Research Centers Program

- Established in 1984; unique network of academic research centers partnering with public health agencies
- Conducts applied public health research, health risk assessment, and other health promotion and disease prevention programs
- Applying research into practice: Innovation, translation, dissemination, and implementation science
- Reach nearly 30 million people in 103 partner communities
Plans to Measure the Impact of Contraceptive Guidelines for Healthcare Providers and Pregnancy Risk Assessment Monitoring System

- **Metrics to systematically monitor use in real-time**
- **Evidence-based clinical guidance**
  - U.S. Medical Eligibility Criteria for Contraceptive Use
    - Recommendations about contraception for >60 medical conditions and characteristics
- **Surveillance systems**
  - Pregnancy Risk Assessment Monitoring System (PRAMS)
    - Collects population-based data on maternal experiences before, during, and shortly after pregnancy

Lee Warner, PhD, MPH
*Associate Director for Science, Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, CDC*
How CDC Evaluates its Public Health Programs

Steps
- Engage stakeholders
- Gather credible evidence
- Describe the program
- Focus the evaluation design
- Justify conclusions
- Ensure use and share lessons learned

Standards
- Utility
- Feasibility
- Propriety
- Accuracy

“Program description” key to choosing most useful evaluation focus

Good evaluation means use of findings

Tom Chapel, MA, MBA
Chief Evaluation Officer
Office of the Associate Director for Program, CDC
What Difference You Can Make Using the Science Impact Framework?

Disseminating Science
Creating Awareness
Catalyzing Action
Effecting Change
Shaping the Future

Health and well-being

Morbidity and mortality

Tanja Popovic, MD, PhD
Deputy Associate Director for Science, CDC
What We Heard Today

- **Shift from sole reliance on traditional bibliometrics**
  - Helps understand how widely the research is disseminated
  - Does not tell us how scientific findings are used toward significant improvements in public health practice or policy

- **What is unique about the Science Impact Framework?**
  - Health outcomes
    - Makes us focus on impact of what we do
    - Applies to a broad range of public health activities
    - Allows monitoring of progress of our work in real time
  - Additional benefits
    - Supports better decision-making, prioritizing, collaborating and communicating
What Can Science Impact Framework Do for YOU?

What The Simpsons® Can Teach Us about Physics, Robots, Life, and the Universe
Track Retrospectively or Monitor Progress and Impact of Your Work

- **Scientific programs and projects**
- **Specific scientific documents**
  - Impact of guidelines and recommendations on practice
  - Major peer-review manuscripts
- **Scientists**
  - Culture change in performance evaluation from current emphasis on number of publications (academic angle) to impact of work (public health angle)
Strengthen Review Process

- **External peer-review**
  - Assess impact of existing extramural science funding
  - Link the funding of new projects and proposals to CDC priorities

- **Science award review**
  - Selection of scientific products and individuals for scientific awards
  - Better understanding of impact on health and well-being of people
Communicate Clearly About Your Work and Its Impact

- **Consistency of narrative and facts, but adjusted for different audiences**
- **Internal communication**
  - Conceptual change from academic to mission-related projects
  - Internal planning and resource allocation
  - Clarity regarding how research impacts people’s health
- **External communication**
  - Assist partners with describing their and your contributions to improving people’s health
"Not everything that counts can be counted, and not everything that can be counted counts."
What You Should Do NOW

From: Howard, John (CDC/NIOSH/OD)
Sent: Monday, January 13, 2014 1:30 PM
To: Ari, Mary D. (CDC/OD/OADS)
Cc: Piacentino, John D. (CDC/NIOSH/OD)
Subject: Terrific Presentation!

Mary:

I just wanted to say how much I enjoyed your presentation today at the Senior Meeting on implementing the research impact framework. I was wondering if you might consider speaking with Dr. John Piacentino, the NIOSH Associate Director for Science, about making a presentation to his group?

Thanks!

John

Center for Surveillance, Epidemiology, and Laboratory Services

From: Iademarco, Michael (CDC/OPHSS/CSELS)
Sent: Tuesday, January 14, 2014 7:45 AM
To: Ari, Mary D. (CDC/OD/OADS)
Cc: Barkley, Mary M. (CDC/OPHSS/CSELS)
Subject: Assessing the impact of science

Mary, nice presentation yesterday morning.

Can you send me a copy of your slides, I want to share with senior leadership here.

Michael
Hi Mary and Tanja,

As I mentioned at the last EISC meeting in 2013, our Center has been looking at ways to evaluate the scientific impact of our projects and programs. To that end, I would like to arrange with you to provide a presentation for our Center on the Science Impact Framework ... We would very much appreciate a presentation to our Center on this important topic ... Thanks, in advance.

--Stuart

Stuart K. Shapira, M.D., Ph.D.
Chief Medical Officer
Associate Director for Science (ADS)
National Center on Birth Defects and Developmental Disabilities (NCBDDD)
Centers for Disease Control and Prevention
1600 Clifton Road, Mailstop E-87
Atlanta, GA 30333
404-498-3882 [phone]
404-498-3070 [fax]
What You Should Do NOW

“If you only got potential then you ain’t got it!”

LET’S MOVE!
Knowing the Impact of Our Work Helps Us Shape Our Future

- Disseminating Science
- Creating Awareness
- Catalyzing Action
- Effecting Change
- Shaping the Future

Morbidity and mortality

Health and well-being

http://www.cdc.gov/od/science/impact