Translating CER Evidence into Practice, Policy and Public Health: The Science of Implementation and Dissemination

Henry Lee, MD, MS
Ralph Gonzales, MD, MSPH
University of California, San Francisco

Henry Lee, MD, MSHS
• Assistant Professor of Pediatrics, Division of Neonatology
• Associate Director of Data Analysis, California Perinatal Quality Care Collaborative
• Scholar, UCSF Clinical and Translational Science Career Development Program

Ralph Gonzales, MD, MSPH
• Professor of Medicine, Epidemiology & Biostatistics
• Director, Program in Implementation and Dissemination Sciences (IDS)
• Associate Director, Clinical and Translational Science Career Development Program

The Translation Imperative in the US
We spend so much…

This figure can be viewed in Murray, C & Frenk, J, NEJM, 2010; 362:99.
The figure shows the amount of healthcare spending as a percent of GDP for different countries. The United States spends the most with approximately 15% of its GDP spent on healthcare. The next highest is Switzerland at approximately 11%, followed by France at just under 11%. The lowest is Turkey at just under 6%. 
The Translation Imperative in the US

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World Health Rankings
- infant mortality 39th
- female mortality 43rd
- male mortality 42nd
- life expectancy 36th

The Translation Imperative in the US

We spend so much... We get so little...

This graph can be viewed in Murray, C & Frenk, J, NEJM, 2010; 362:99.

This graph shows the probability of death for boys and men 15-60 years of age in Sweden, Australia and the United States from 1970-2007. Death rates decreased in all countries during this time frame. The US consistently had the highest rate of death.

NIH Roadmap Initiative
-translating discoveries into health

“I think that we have to ask ourselves whether much of the output of biomedical science is getting lost in translation?”

–C. Lenfant, NEJM 2003;349:868-74. Former Director NHLBI.
NIH Roadmap Initiative - translating discoveries into health

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Outline

– Taxonomy of translation
– Conceptual framework for translation
– Making the case for translation
  • Selecting the evidence
  • Measure quality and its determinants
  • Quality gap
  • Outcome gap
– Making change happen…

Outline

A  – Taxonomy of translation
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“T2” Taxonomy and Beyond

This figure can be viewed in Dougherty, Conway, JAMA, May 21, 2008, vol 299, no 19.

This figure represents the 3T’s Road Map of translational steps proposed to reform health care. Across the top of the figure are various research domains: basic biomedical science, clinical efficacy knowledge, clinical effectiveness knowledge and improved health care quality and value and population health.

T1 asks what care works and represents clinical efficacy research. This takes place between basic biomedical science and clinical efficacy knowledge.

T2 asks who benefits from promising care and represents outcomes research, comparative effectiveness research and health services research. This takes place between clinical efficacy knowledge and clinical effectiveness knowledge.

T3 asks how to deliver high quality care reliably in all setting and represents measurement accountability, implementation of interventions and health care system redesign, scaling and spread of effective interventions, and research in these domains. This takes place between clinical effectiveness knowledge and improved health care quality and value and population health.
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T3 asks how to deliver high quality care reliably and in all setting and represents measurement accountability, implementation of interventions and health care system redesign, scaling and spread of effective interventions, and research in these domains. This takes place between clinical effectiveness knowledge and improved health care quality and value and population health.

“T2” Taxonomy and Beyond

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Caveat: CER can also be used to compare specific health care interventions and system redesigns...

Translating Evidence Into Practice -- an evolving language

- T4 (public sector)
- T5 (global health)

Szilagyi - Acad Pediatrics 2009
Kon – Am J Bioeth 2008
Translating Evidence Into Practice -- an evolving language

- T4 (public sector)
- T5 (global health)

- Knowledge Translation
- Dissemination and Implementation Science
- Implementation and Dissemination Science

Szilagyi - Acad Pediatrics 2009
Kon – Am J Bioeth 2008

NIH Definitions

- Implementation =
  - “the use of strategies to adopt and integrate evidence-based health interventions and change practice patterns within specific settings”

NIH PAR 07-086

NIH Definitions

- Implementation =
  - “the use of strategies to adopt and integrate evidence-based health interventions and change practice patterns within specific settings”
- Dissemination =
  - “the targeted distribution of information and intervention materials to a specific public health or clinical practice audience”

NIH PAR 07-086
CER Translation Examples

- Individual Patient/Community Level
  - How do we increase patient adoption of evidence-based weight loss/dietary strategies?

- Individual Physician Level
  - How do we increase physician counseling and recommendations of evidence-based strategies for weight loss?
An Ecological View of Translating Evidence into Practice (and Health)

CER Translation Examples

- **Health Care Delivery System Level**
  - How do we get clinical delivery systems to offer comprehensive dietary and weight management programs?

- **Stakeholder/Policy Level**
  - How do we convince payors to provide reimbursement for weight loss programs?
Principles Guiding Implementation Design

1. Behavior change is inherent in the translation of evidence into practice, policy and public health.

2. Key components of behavior change strategies include the intervention (stimulus), a response, and feedback to intervention stakeholder.

3. Successful implementation of behavior change strategies are iterative, favoring cycles and bidirectional relationships.
Principles Guiding Implementation Design

1. Behavior change is inherent in the translation of evidence into practice, policy and public health.
2. Key components of behavior change strategies include the intervention (stimulus), a response, and feedback to intervention stakeholder.
3. Successful implementation of behavior change strategies are iterative, favoring cycles and bidirectional relationships.
4. Community engagement is imperative to achieving meaningful and sustained behavior change.

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B – Making the case for translation
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What CER Evidence Do you Want to Translate?

Types of Evidence
• Health Related Behaviors
• Tests
• Treatments
• Procedures
• Interventions
• Programs
Is the CER Evidence Ready for Translation?

Levels of Evidence

• Efficacy

• Effectiveness
Is the CER Evidence Ready for Translation?

Levels of Evidence

- Efficacy
- Effectiveness
- Systematic Reviews
- Meta-analysis
- Consensus Statements
- Practice Guidelines
Efficacy vs. Effectiveness

Levels of Evidence

• Efficacy – positive results in a controlled experimental trial in very specific (optimal) setting / patients
• Effectiveness – positive results in a wide variety of settings in usual practice conditions – “the real world”

Effectiveness vs. efficacy - example

• Premature birth results in respiratory distress syndrome due to surfactant deficiency.
• Antenatal steroids are given to accelerate lung maturity in preterm birth -

Image from: http://www.flickr.com/photos/hudsonthego/157022268/k/size/l/public/1/hudsonthego

Effectiveness vs. efficacy - example

• Pediatrics 1972

A CONTROLLED TRIAL OF ANTEPARTUM GLUCOCORTICOID TREATMENT FOR PREVENTION OF THE RESPIRATORY DISTRESS SYNDROME IN PREMATURE INFANTS

From the Postgraduate School of Obstetrics and Gynaecology, University of Auckland, New Zealand
Effectiveness vs. efficacy - example

- Pediatrics 1972

**A CONTROLLED TRIAL OF ANTEPARTUM GLUCOCORTICOID TREATMENT FOR PREVENTION OF THE RESPIRATORY DISTRESS SYNDROME IN PREMATURE INFANTS**


From the Department of Obstetrics and Gynaecology, University of Auckland, New Zealand

- 282 mothers – non-antenatal steroid group had 4x more mortality and 2.5x more respiratory distress syndrome.
- Average gestational age 32 weeks / birth weight 2300 grams

Effectiveness vs. efficacy - example

- Subsequent clinical trials showed efficacy in other populations.
- Observational studies showed effectiveness in the general population of premature infants, including those born as early as 24 to 26 weeks.


Effectiveness vs. efficacy - example

- Subsequent clinical trials showed efficacy in other populations.
- Observational studies showed effectiveness in the general population of premature infants, including those born as early as 24 to 26 weeks.
- Observational studies also showed effectiveness outside of clinical trial setting.
- NIH recommendations since 1994 that mothers delivering between 24 and 34 weeks gestational age should receive antenatal steroids.

Effectiveness vs. efficacy

- Efficacy may not always translate to effectiveness.
- Efficacy studies – Does the treatment work under ideal circumstances?
- Effectiveness – Does the target population adhere to treatment? Is it safe in non-experimental setting?

Bronchiolitis

- Viral disease of small airways in infants often caused by RSV (respiratory syncytial virus)

• A Randomized Trial of Nebulized Epinephrine vs. Albuterol in the Emergency Department Treatment of Bronchiolitis
  (Mull Arch Pediatr Adolesc Med. 2004;158)
• Comparison of nebulized epinephrine to albuterol in bronchiolitis.
  (Walsh Acad Emerg Med. 2008;15)
• Racemic epinephrine compared to salbutamol in hospitalized young children with bronchiolitis; a randomized controlled clinical trial.
  (Langley BMC Pediatr. 2005;5)
• Randomized, placebo-controlled trial of albuterol and epinephrine at equipotent beta-2 agonist doses in acute bronchiolitis.
  (Ralston Pediatr Pulmonol. 2005;40)
• A randomized, controlled trial of the effectiveness of nebulized therapy with epinephrine compared with albuterol and saline in infants hospitalized for acute viral bronchiolitis.
  (Patel J Pediatr. 2002;141)
The Evidence-Based Medicine Movement (1990 →)

Rating the Evidence: Systematic Reviews
• The Cochrane Collaboration (www.cochrane.org)

• Cochrane Effective Practice and Organisation of Care (EPOC) Group (www.epoc.cochrane.org)
  – Systematic reviews of health care interventions
• National Cancer Institute (www.cancer.gov)

Meta-analyses
• Cochrane Review. Epinephrine for bronchiolitis. 2004;(1): CD003123

• AHRQ. Management of Bronchiolitis in Infants an Children. Evidence Report / Technology Assessment No. 69. 2003. 03-E014
Meta-analyses

- AHRQ. Management of Bronchiolitis in Infants an Children. Evidence Report / Technology Assessment No. 69. 2003. 03-E014

At most, 1 in 4 patients may have transient improvement with unclear clinical benefit.

Making Recommendations: Practice Guidelines

- USPSTF (www.ahrq.gov/CLINIC/uspstfix.htm)
- CDC (www.cdc.gov)
- Professional Societies
- GRADE

"Clinicians should not routinely order laboratory and radiologic studies for diagnosis"
Clinicians should not routinely order laboratory and radiologic studies for diagnosis.

Bronchodilators should not be used routinely in the management of bronchiolitis (preponderance of harm of use over benefit).

A carefully monitored trial of -adrenergic or – adrenergic medication is an option.

Making Recommendations: Practice Guidelines

- National Institute for Health and Clinical Excellence (UK) – http://www.nice.org.uk
- The Guidelines International Network – http://www.g-i-n.net
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Quality of Health Care
- c. 1980s

- Donabedian A. JAMA 1988;260:1743-8

<table>
<thead>
<tr>
<th>Structure</th>
<th>Process</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Characteristics</td>
<td>Health Care Providers</td>
<td>Outcomes</td>
</tr>
<tr>
<td>Delivery System Characteristics</td>
<td>Technical Processes</td>
<td>Health Status</td>
</tr>
<tr>
<td>Provider Characteristics</td>
<td>-Interpersonal Processes</td>
<td>Functional Status</td>
</tr>
<tr>
<td>Population Characteristics</td>
<td>Public &amp; Patients</td>
<td>Satisfaction</td>
</tr>
<tr>
<td></td>
<td>-Access</td>
<td>Mortality</td>
</tr>
<tr>
<td></td>
<td>-Acceptance</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>-Adherence</td>
<td></td>
</tr>
</tbody>
</table>
“Quality Indicators”
The Many Faces of Quality

• Outcomes
• Structure
  – Access to care, tests, treatments, procedures

• Processes... Things you can influence!
  – Performance Measures
    • System and Clinician Oriented
      – Testing; treatment; referrals; counseling; communication
    • Patient and Public Oriented
      – Adherence; testing; self-care; office visits; lifestyle; healthy behaviors

SPECIAL ARTICLE

The Quality of Health Care Delivered to Adults in the United States

Elizabeth A. McGlynn, Ph.D.; Steven M. Asch, M.D., M.P.H.; John Adams, Ph.D.; Joan Keesey, B.A.; Jennifer Hicks, M.P.H.; Ph.D.; Alison DeCristofaro, M.P.H.; and Eve A. Kerr, M.D., M.P.H.

McGlynn EA. NEJM 2005
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<table>
<thead>
<tr>
<th>Condition</th>
<th>Recommended Care, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senile Cataract</td>
<td>79%</td>
</tr>
<tr>
<td>Breast Cancer</td>
<td>76%</td>
</tr>
<tr>
<td>Prenatal Care</td>
<td>73%</td>
</tr>
<tr>
<td>Dyspepsia/Ulcer Disease</td>
<td>33%</td>
</tr>
<tr>
<td>Atrial Fibrillation</td>
<td>25%</td>
</tr>
<tr>
<td>Hip Fracture</td>
<td>23%</td>
</tr>
<tr>
<td>Alcohol Dependence</td>
<td>11%</td>
</tr>
<tr>
<td>Overall Average</td>
<td>55%</td>
</tr>
</tbody>
</table>

McGlynn EA, NEJM 2005
CMS/JCAHO & Hospital Compare
-Hospital Quality Measures

Patient Hospital Experiences
- Communication
- Pain Control
- Explanation of Treatments and Recovery
- Cleanliness & Quietness
- Overall Rating and Recommendation to Others

Process of Care Measures
- Surgical Care Improvement Project Measures
- Heart Attack & Chest Pain
- Pneumonia
- Heart Failure
- Childhood Asthma

Outcome Measures
- Risk-Adjusted Condition-Specific 30-day Mortality; Readmissions

Use of Medical Imaging
Medical imaging

<table>
<thead>
<tr>
<th>Outpatients with low back pain who had an MRI without being recommended to do so, such as physical therapy. (If a number is high, it may mean the facility is doing too many unnecessary tests for low back pain.)</th>
<th>27.1%</th>
<th>27.1%</th>
<th>57.1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outpatients who had a follow-up mammogram or ultrasound within 12 months of the prior test. (A number that is much lower than the may mean there’s not enough follow-up. A number much higher than 1% may mean there’s too much unnecessary follow-up.)</td>
<td>9.0%</td>
<td>11.0%</td>
<td>9.2%</td>
</tr>
</tbody>
</table>
Measure Quality Yourself: Administrative Claims Data

Administrative data collected as a result of "claims" submitted by physicians/practices for reimbursement.

- Medicare (UB-92)
  - No pharmacy data

- Medicaid (Drug Utilization Review; OSHPD)
  - Enrollment rollercoaster

- Integrated Delivery Systems (Kaiser; Geisinger; etc)
  - Generalizability

- Hospital Networks (Premier)
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Computerized health records are becoming a new resource for quality and outcome measurement…

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Making Your Case…

Determine the Quality Gap
• Implementation of evidence-based management of acute bronchiolitis.

Antenatal steroids for premature infants – California Perinatal Quality Care Collaborative

• Wide variability in hospital’s antenatal steroid administration rates.

Quality Indicators and Benchmarks

• When guidelines exist
  – HEDIS

• When guidelines don’t exist
  – Dartmouth Atlas
HEDIS Effectiveness of Care Measures 2003, comm

- Beta-blocker post MI 94%
- Cancer screening
  - Breast 75%
  - Cervical 82%
  - Colorectal 47%
- Chlamydia screening 30%
- Cholesterol screening 79%
- HbA1c testing 85%
- Eye exams in diabetes 49%
- Controlling hypertension (<140/90) 62%
- LDL < 100 after 60 days of MI 48%

When Guidelines Don’t Exist
CABG Rates per 1000 Medicare enrollees, 1999

Dartmouth Atlas Areas

<table>
<thead>
<tr>
<th>Medical Discharges</th>
<th>Surgical Discharges</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Discharges for COPD</td>
<td>- Coronary Angiography</td>
</tr>
<tr>
<td>- Bacterial Pneumonia Discharges</td>
<td>- All Surgical Discharges</td>
</tr>
<tr>
<td>- Discharges for CHF</td>
<td>- Back Surgery</td>
</tr>
<tr>
<td>- Kidney/Urinary Infection Discharges</td>
<td>- CABG</td>
</tr>
<tr>
<td>- Dehydration Discharges</td>
<td>- Cholecystectomy</td>
</tr>
<tr>
<td>- Non-ACS Medical Discharges</td>
<td>- Hospitalization for Hip Fracture</td>
</tr>
<tr>
<td>- Discharges for ACS Conditions</td>
<td>- Knee Replacement</td>
</tr>
<tr>
<td>- All Medical Discharges</td>
<td>- Percutaneous Coronary Interventions</td>
</tr>
<tr>
<td>- High Variation Medical Discharges</td>
<td>End-of-Life Care (last 6 mo)</td>
</tr>
<tr>
<td>- Low/Mid. Variation Medical Discharges</td>
<td>ICU Care</td>
</tr>
<tr>
<td>- Discharges for Respiratory Infections</td>
<td></td>
</tr>
<tr>
<td>- Acute Myocardial Infarction Discharges</td>
<td></td>
</tr>
<tr>
<td>- Cardiovascular Discharges (except TIA)</td>
<td></td>
</tr>
<tr>
<td>- Cardiac Arrhythmia Discharges</td>
<td></td>
</tr>
<tr>
<td>- Syncope and Collapse Discharges</td>
<td></td>
</tr>
<tr>
<td>- Gastro-Intestinal Hemorrhage Discharges</td>
<td></td>
</tr>
<tr>
<td>- Chest Pain Discharges</td>
<td></td>
</tr>
<tr>
<td>- Nutritional and Metabolic Disorders</td>
<td></td>
</tr>
<tr>
<td>- Septicemia Discharges</td>
<td></td>
</tr>
</tbody>
</table>
Link Quality Gap to Outcome Gap
Linking Quality Gap to Outcome Gap

- Safe
- Effective
- Efficient
- Equitable
- Patient-Centered
- Timely

STAKEHOLDERS
- Government
- Payors
- Prof. Societies
- Academia

COMMUNITY

EVIDENCE

Health Care Delivery Systems

Providers

Patients

Public

QUALITY OF CARE

OUTCOME

The Public Health and Business Case

Linking Quality Gap with Outcomes...

Werner R, 2006

TABLE 4. PREVENTION OF 1,000 DEATHS AND MEDICAL COSTS DUE TO EXPLAINED VARIATIONS IN CARE.

<table>
<thead>
<tr>
<th>Module</th>
<th>Avoidable Deaths</th>
<th>Avoidable Hospital Costs (in million USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Block Treatment after a heart attack</td>
<td>100 / 1,200</td>
<td>16.1 / 980.3</td>
</tr>
<tr>
<td>Breast Cancer Screening</td>
<td>490 / 680</td>
<td>295 / 463.1</td>
</tr>
<tr>
<td>Cervical Cancer Screening</td>
<td>600 / 800</td>
<td>N/A</td>
</tr>
<tr>
<td>Cholesterol Management</td>
<td>4,400 / 9,400</td>
<td>260.1 / 906.9</td>
</tr>
<tr>
<td>Preventive Cardiac Screening</td>
<td>3,800 / 9,800</td>
<td>1,348 / 492.1</td>
</tr>
<tr>
<td>Controlling High Blood Pressure</td>
<td>9,200 / 22,800</td>
<td>2,925 / 778.6</td>
</tr>
<tr>
<td>Diabetes Care with 1. Control</td>
<td>7,100 / 11,400</td>
<td>1,319 / 61.3</td>
</tr>
<tr>
<td>Osteoporosis Management</td>
<td>N/A</td>
<td>99.9 / 10.6</td>
</tr>
<tr>
<td>Preventaion</td>
<td>1,000 / 1,600</td>
<td>N/A</td>
</tr>
<tr>
<td>Smoking Cessation</td>
<td>7,000 / 10,700</td>
<td>673 / 621.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>35,900 / 75,000</td>
<td>2,7 billion / 1.7 billion</td>
</tr>
</tbody>
</table>

The State of Health Care Quality 2008 - NCQA

http://www.ncqa.org/portals/0/newsroom/sohc/SHOC_08.pdf

Not a No-Brainer

Linking Quality Gap with Outcomes...

Werner R, 2006

<table>
<thead>
<tr>
<th>Module</th>
<th>Percentage of Population with N/A Prevalence</th>
<th>N/A vs. Non-N/A Prevalence</th>
<th>N/A vs. Non-N/A Prevalence</th>
<th>N/A vs. Non-N/A Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Block Treatment</td>
<td>76%</td>
<td>24%</td>
<td>76%</td>
<td>24%</td>
</tr>
<tr>
<td>Breast Cancer</td>
<td>40%</td>
<td>60%</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>Cervical Cancer</td>
<td>60%</td>
<td>40%</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>Cholesterol Management</td>
<td>40%</td>
<td>60%</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>Preventive Cardiac</td>
<td>30%</td>
<td>70%</td>
<td>30%</td>
<td>70%</td>
</tr>
<tr>
<td>Controlling High Blood Pressure</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Diabetes Care with 1. Control</td>
<td>75%</td>
<td>25%</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
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</table>

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Werner R. JAMA 2006
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  - Outcome gap
- Making change happen…
Making Change Happen…

- Impact of a Bronchiolitis Guideline – A Multisite Demonstration Project. Chest 2002
- Promoting antenatal steroid use for fetal maturation: results from the California Perinatal Quality Care Collaborative. J Pediatr 2006

Readings

- Auerbach AD, Landefeld CS, Shojania KG. The Tension between Needing to Improve Care and Knowing How to Do it. NEJM 2007;357:608-13.

- Institute of Medicine. Crossing the Quality Chasm: A New Health System for the 21st Century. Executive Summary (pp 1-20)
Summary

• Translating evidence into practice, policy and public health depends on aligning behaviors of stakeholders, delivery systems, providers, patients and the public.

• Stakeholders, health care providers and the public need to monitor health care quality, and inform the development of new evidence and translational activities.

Summary

• Quality of care is a function of the structure, processes and outcomes of care
  – Changes to the structure and processes of care can lead to improved outcomes of care…

• Improving the quality of health care should maximize safety, effectiveness, efficiency, patient-centeredness, and/or timeliness of care; and reduce disparities in care.
Summary

• To Make Your Case for translating evidence into practice for a specific topic
  – Measure its quality, determine the quality gap, and link the quality gap to an outcome gap

NCQA, The State of Health Care Quality 2007
References & Resources


