Does Your Research Make a Difference? Translation of Sun Protection Behavior into Community Settings

Lois J. Loescher, PhD, RN, FAAN
The University of Arizona
Colleges of Nursing and Public Health
Skin Cancer Institute
* Introductions: Who am I, where am I from and why am I here?
* Provide brief information about translational models.
* Summarize community-focused dissemination and implementation studies of UVR protection and gaps in translation.
* Summarize recommendations for future dissemination and implementation research pertaining to UVR protection.
* Education
  * PhD in Nursing University of Arizona
  * R25 Postdoctoral training in cancer prevention & control, Arizona Cancer Center
* Associate Professor, Colleges of Nursing and Public Health
* Co-Director, Behavioral Measurement & Intervention Shared Resource at the University of Arizona Cancer Center
* Areas of interest: skin cancer prevention & detection, use of technology as an intervention, training & education

* Who am I?
* Established working groups
  * Epi-behavioral
  * Clinical
  * Omics
  * Chemoprevention
  * Tissue Bank

Tucson 10/2010  Brisbane 04/2011

* Why am I here? The Pan-Pacific Skin Cancer Consortium (PPSCC)*
A complex process of transforming knowledge through successive fields of research from basic science discoveries to public health interventions and impact (Drolet & Lorenzi, 2011).
Vetting of the research through successive screens assures the quality of the research delivered to practitioners and policy makers, but it does little to assure the relevance and fit of that research to the needs, circumstances, and populations of those practice or policy applications (Green, 2009).

A rate of 50% use in the target population (Westfall et al., 2007).

* Complexity of Translation: Lack of Achievement
Translation has only relatively recently become a major focus in biomedical research.

* 2001 Institute of Medicine Quality Chasm Report
* 2001 JAMA call for translational research (TR) papers
* 2003 NIH Roadmap
* 2005 NIH Clinical and Translational Science Awards
* 2012 National Center for Advancement of Translational Science
Some frameworks prevent the identification of steps during which research and knowledge become “lost in translation,” and, therefore, do not reach public health gains (Drolet & Lorenzi, 2011).

* Money lost
* Time lost
* No gain

**Complexity of Translation: Inadequate Frameworks**
* Multi-directional integration
* T1: improved scientific understanding or standards of care
* T2: better patient outcomes, best practices, improved community health
* T3: interaction between lab-based & population-based research to enhance understanding of health
* Long-term goal improving public health

* Association for Clinical Research Training Model (2010)
T indicates translation. T1, T2, and T3 represent the 3 major translational steps in the proposed framework to transform the health care system. The activities in each translational step test the discoveries of prior research activities in progressively broader settings to advance discoveries originating in basic science research through clinical research and eventually to widespread implementation through transformation of health care delivery. Double-headed arrows represent the essential need for feedback loops between and across the parts of the transformation framework.

* Dougherty & Conway Model (2008)
**Drolet & Lorenzi Model (2011)**

**Fig 1. Biomedical research translation continuum.**

<table>
<thead>
<tr>
<th>Pathway</th>
<th>Inquiry and Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Science Discovery</td>
<td><strong>Does beta-blockade decrease chronotropy and inotropy?</strong></td>
</tr>
<tr>
<td><strong>T1</strong> Translation of basic science to humans</td>
<td><strong>Evaluation of biochemical findings in animals, proposal of a potential medical application</strong></td>
</tr>
<tr>
<td>Proposed Human Application</td>
<td><strong>Can beta-blocking drugs be used to prevent further ischemic injury following myocardial infarction?</strong></td>
</tr>
<tr>
<td><strong>T2</strong> Translation to clinical treatment (e.g. drug development)</td>
<td><strong>Evaluation of safety and efficacy (i.e. clinical trials)</strong></td>
</tr>
<tr>
<td>Effective Clinical Application</td>
<td><strong>How do we get physicians to use beta-blockers in practice?</strong></td>
</tr>
<tr>
<td><strong>T3</strong> Translation to practice</td>
<td><strong>Implementation and Adoption</strong></td>
</tr>
<tr>
<td>Clinical Practice</td>
<td><strong>In true clinical setting, does beta-blocker administration decrease morbidity and mortality?</strong></td>
</tr>
<tr>
<td><strong>Public Health Impact</strong></td>
<td><strong>Practice-based research networks; patient registries; cohort and case-control studies; meta-analysis</strong></td>
</tr>
<tr>
<td><strong>Continual practice improvement</strong></td>
<td><strong>Findings in any stage feedback to previous research stages (dotted line) for further examination and action</strong></td>
</tr>
</tbody>
</table>
**T1**

**INNOVATION**

**PUBLISHED & PATENTED**

To reach T1, a project must have been through a discovery phase to arrive at an innovation which has been published, patented and is awaiting clinical study.

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**T2**

**CLINICAL STUDY**

The T2 milestone is reached when planned human studies meet ethical requirements. This phase may involve a small number of patients in a clinical trial.

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**T3**

**CLINICAL TRIAL**

The T3 milestone involves expanded trials with more patients at a number of different locations. This phase often takes several years to ensure the discovery is beneficial and effective.

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**T4**

**CLINICAL PRACTICE**

T4 is reached when a discovery has been published, peer reviewed, tested and proven successful to the extent that it is adopted into clinical practice.

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**T5**

**INTERNATIONAL ADOPTION AND ASSESSMENT**

The T5 milestone is achieved once independent evaluation by organisations such as WHO has established a proven health benefit on a world-wide basis.

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**TRI Australia (2016)**
* **Efficacy trials**: Evaluations of health status or behavior change process as implemented under ideal or laboratory conditions.

* **Effectiveness trials**: Evaluations of health status or behavior change process implemented under real or usual conditions (generally to large defined populations).

* **Dissemination studies**: Examine and evaluate the conditions that impede or facilitate widespread use of the intervention promoting a health status or behavior change process (address consumer behavior and measurement of public health impact).

* **Implementation studies**: Examine readiness for an intervention and how that intervention can be successfully integrated in the real world.

(Rabin et al., 2008; Sussman et al., 2006, Tabak et al., 2012)
<table>
<thead>
<tr>
<th>Participating Organization(s)</th>
<th>National Institutes of Health (NIH)</th>
</tr>
</thead>
</table>
| **Components of Participating Organizations** | **National Cancer Institute (NCI)**  
|   | **National Heart, Lung, and Blood Institute (NHLBI)**  
|   | **National Human Genome Research Institute (NHGRI)**  
|   | **National Institute on Aging (NIA)**  
|   | **National Institute on Alcohol Abuse and Alcoholism (NIAAA)**  
|   | **National Institute of Allergy and Infectious Diseases (NIAID)**  
|   | **Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD)**  
|   | **National Institute on Deafness and Other Communication Disorders (NIDCD)**  
|   | **National Institute of Dental and Craniofacial Research (NIDCR)**  
|   | **National Institute on Drug Abuse (NIDA)**  
|   | **National Institute of Environmental Health Sciences (NIEHS)**  
|   | **National Institute of Mental Health (NIMH)**  
|   | **National Institute of Neurological Disorders and Stroke (NINDS)**  
|   | **National Institute of Nursing Research (NINR)**  
|   | **National Institute on Minority Health and Health Disparities (NIMHD)**  
|   | **National Center for Complementary and Integrative Health (NCCIH)**  
|   | **Division of Program Coordination, Planning and Strategic Initiatives, Office of Disease Prevention (ODP)**  
|   | **Office of Behavioral and Social Sciences Research (OBSSR)** |
| **Funding Opportunity Title** | **Dissemination and Implementation Research in Health (R01)** |
| **Activity Code** | **R01 Research Project Grant** |
| **Announcement Type** | **Reissue of PAR-13-055** |
9th Annual Conference on the Science of Dissemination and Implementation: Mapping the Complexity and Dynamism of the Field

This year’s theme, Mapping the Complexity and Dynamism of the Field, focuses on how effective interventions can be applied to a variety of clinical and community settings, with a long-term evaluation component focusing on decisions about whether interventions should be sustained or discontinued (“de-implemented”). Conference sessions will unpack the dynamism and complexity of dissemination and implementation processes.

Given the breadth of the field and the importance of maximizing opportunities for participants to follow consistent themes throughout the concurrent sessions of the meeting, we are including nine thematic tracks to organize the conference agenda.

Additional Co-Sponsors
Patient-Centered Outcomes Research Institute (PCORI) | Robert Wood Johnson Foundation | United States Department of Veterans Affairs (VA) | Agency for Healthcare Research and Quality (AHRQ)

Website: [http://diconference.academyhealth.org/home](http://diconference.academyhealth.org/home)
*There is established evidence that UVR reduction/sun protection is effective for primary prevention of skin cancer.

*Knowledge produced by D&I research is a key factor in the uptake and use of evidence-based cancer control interventions.

*Sun protection interventions are ready for D&I (Rabin et al., 2010)
*Systematic review of dissemination and implementation research on community-based cancer prevention (Rabin et al, 2010).

* Literature covered topic areas including sun protection.


* Authors classified articles by suitability of study design, quality of execution, and effectiveness; abstracted articles for dissemination- and implementation-related content.

* D&I in the Context of Sun Protection
Findings of Rabin et al. (2010) pertaining to D&I of sun protection interventions:

- 4 of 20,824 articles:
  - Effectiveness of two strategies for dissemination of sun-protection policy in New South Wales primary and secondary schools (Schofield, 1997)
  - Web-based strategies to disseminate a sun safety curriculum to public elementary schools and state-licensed child-care facilities (Buller, 2005)
  - Diffusion of skin cancer prevention training to lifeguards (Glanz, 2005)
  - Disseminating a tailored sun safety program to zoological parks (Lewis, 2005)

- All had some evidence of effectiveness, greatest suitability of design and fair execution
- Definitions of implementation and dissemination were inconsistent
- Targeted diverse settings and populations
- One resulted in policy changes

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* D&I in the Context of Sun Protection
* Updated from 2008 – September 2016; Humans
  * Searched the Embase® database using key terms of sun protection + dissemination and implementation
    * Embase indexes over 9,000 journals with a global coverage superior to that of PubMed and MEDLINE. Indexes substantially more European and global journals than MEDLINE
    * Key terms for first search: ‘sun protection’ (1949 hits)+ dissemination and implementation (3929 hits)
  * 4 articles

* D&I in the Context of Sun Protection: Current Literature
<table>
<thead>
<tr>
<th>Author</th>
<th>Target</th>
<th>Model</th>
<th>Intervention</th>
<th>Primary outcome</th>
<th>Effectiveness</th>
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</thead>
<tbody>
<tr>
<td>Glanz et al. (2014)</td>
<td>Managers of 495 swimming pools in the US</td>
<td>Social Cognitive Theory DIT Organization change theory</td>
<td>Educational and environmental policy intervention for skin cancer prevention at outdoor swimming pools. Pool Cool toolkit + annual training for aquatics staff from the field coordinator. Enhanced: extra incentives, reinforcements, feedback, skill-building guidance, tools to increase sustainability</td>
<td>Sun safety policies and environments, obstacles and supporting factors for sun safety; Program implementation, maintenance, and sustainability.</td>
<td>Both treatment groups improved program implementation; pools in the enhanced condition had significantly greater overall maintenance of the program over 3 summers of participation and established and maintained significantly greater sun-safety policies and supportive environments over time.</td>
</tr>
<tr>
<td>Andersen et al. (2012)</td>
<td>2228 employees of 67 ski resorts</td>
<td>NR</td>
<td>Basic or enhanced Go Sun Smart delivered to employees who completed baseline and posttest surveys within a year</td>
<td>Associations among program utilization, employee exposure to sun-protection messages, and their sun-safety behaviors</td>
<td>Employees who received enhanced GSS had elevated program exposure (recalled a Message that increased with more GSS program items in use). More employees exposed to messages engaged in sun safety behaviors than those unexposed. At worksites using nine or more items (versus 4-8 or &lt;4), employees engaged in additional sun-safety behaviors. Program effects were strongly mediated by increased self-efficacy.</td>
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<tr>
<td>Walkosz et al. (2014) Dissemination of Go Sun Smart in Outdoor Recreation: Effect of Program Exposure on Sun Protection of Guests at High-Altitude Ski Areas</td>
<td>3,380 adult guests at 61 U.S. and Canadian ski areas were interviewed on chairlifts in three ski seasons (2003–2004, 2004–2005, 2005–2006).</td>
<td>DIT</td>
<td>Basic or enhanced GSS materials displayed or promoted at ski areas. Program use was assessed by on-site observation and guest message exposure, and sun protection was measured in intercept surveys at ski areas.</td>
<td>Self-reported sun protection Exposure to sun safety messages will engage in more sun protection.</td>
<td>Dissemination strategy was not significantly related to sun safety practices. Ski areas displaying at least 6 GSS materials in guest-only areas and 9 GSS materials throughout the area increased guests’ message exposure. Higher message exposure within the high-use ski areas was associated with improved sun protection by guests but not within the low-use ski areas.</td>
</tr>
<tr>
<td>Buller et al. (2015) Sustainability of the Dissemination of an Occupational Sun Protection Program in a Randomized Trial</td>
<td>69 U.S. and Canada ski areas</td>
<td>NR</td>
<td>Randomized to: 1) 23 Go Sun Smart materials including posters, small decals, magnets, outdoor signage, signage for ski/snowboard schools, brochures for employees and guests, training program, newsletter articles, and brief messages 2) Enhanced: added personal contact between project staff and senior managers</td>
<td>Extent of use of GSS collected though on-site observations by 18 trained projet staff in the immediate and long-term (2 yrs) follow up posttest</td>
<td>Use of GSS declined from immediate to long-term follow-up Posttest (p = .01) 17 ski areas used none of GSS at the long-term follow-up; 14 ski areas were still using 9 or more items (compared with 15 ski areas were using 9 or more items at the immediate posttest.</td>
</tr>
</tbody>
</table>
* All studies had some evidence of effectiveness, greatest suitability of design and good execution
* Definitions of implementation and dissemination were absent or consistent
* Targeted somewhat different populations than gen 1 review
* Pool Cool resulted in policy changes
* Ski studies did not result in sustainability

* D&I in the Context of Sun Protection
365 Ski Areas in NSAA

- 28 in efficacy trial
- 208 did not meet eligibility requirements

129 Eligible Ski Areas

**Randomization**

**BASIC CONDITION**
- 64 Ski Areas
  - 28 ski areas refused
  - 36 Ski Areas Enrolled
  - 352 Managers Invited to Pretest

**ENHANCED CONDITION**
- 65 Ski Areas
  - 32 ski areas refused
  - 33 Ski Areas Enrolled
  - 312 Managers Invited to Pretest

Recruitment (blinded)

- 17 managers were no longer employed
- 18 managers refused
- 72 managers did not respond

36 Ski Areas Pretested
- 245 Managers Completed Pretest

1 ski area dropped, including 7 pretested managers
- 7 managers were no longer employed
- 8 managers refused
- 58 managers did not respond
- 2 managers provided incomplete pretest surveys

**Intervention**

- 35 Ski Areas Posttested
  - 163 Managers Completed Posttest
  - 68 Ski Areas Analyzed
  - 314 Manager Surveys Analyzed

**Intermediate Sustainability 1-2 Years Post-Randomization**

- 35 Ski Areas Posttested
  - 60 Ski Area Analyzed

9 ski area dropped, including 79 original managers
- 154 managers no longer employed at participating ski areas

**Long-Term Sustainability 5-7 Years Post-Randomization**

- 27 Ski Areas Posttested
  - 164 Managers Completed Posttest
  - 53 Ski Area Analyzed
  - 286 Manager Surveys Analyzed

- 26 Ski Areas Enrolled in Sustainability Study
  - 108 Original Managers and
  - 118 New Managers Invited to Posttest

- 94 Managers did not respond

- 27 Ski Areas Enrolled in Sustainability Study
  - 138 Original Managers and
  - 111 New Managers Invited to Posttest

- 85 Managers did not respond
* Many studies demonstrate efficacy and effectiveness of sun protection and UV exposure behaviors, few are D&I studies, and even fewer show impact on communities and public health.

* Develop and use an agreed-on terminology for D&I research.

* Use titles and key words that reflect D&I.

* Future studies should consider multicomponent interventions, designs that foster external validity, and consider more disparate target populations in community settings.

* Develop alternative strategies for sustainability.

* **Gaps in D&I Studies of Sun Protection**
2011 Small grant from a community foundation: Train university health sciences students in sun safety.

The peer leaders travel to community classrooms to implement Project SASS, which consists of a brief PowerPoint™ presentation (covers basic epidemiology, skin structure, types of skin cancer, UVR, sun protection strategies, and tanning consequences), followed by 3 interactive activities to reinforce key concepts.

Study 1: Pilot test showing reach and satisfaction of intervention (trained 75 volunteers to reach 25 schools)
Extended concept

- Created an academic course:
  - University of Arizona (UA) health sciences students (peer leaders) enroll in a one-semester skin cancer prevention academic course. This course consists of online modules covering skin cancer epidemiology, types, prevention and communication, followed by an in-person skills training and teach-back session.
  - For credit or independent study service learning
  - Became established COPH online course (CPH 497S/597S)

- Study 2: Quasi-experimental design used to evaluate Project SASS on primary outcomes of behavioral intention and satisfaction. Middle schoolers showed significantly improved knowledge and behavioral intentions. (Davis et al, 2014)

*Training the next generation: Ideas for Sustainability*
* Current status

* Trained 300 peer leaders via course who presented Project SASS to 4700 students;
  * 181 (60%) peer leaders completed evaluations over 10 semesters.

* 54 teachers and 2,480 students evaluated peer leaders over 7 semesters.
<table>
<thead>
<tr>
<th>Participant</th>
<th>Item</th>
<th>Mean Score Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Peer Leaders</strong></td>
<td>I am likely to volunteer to present Project SASS again in the future.</td>
<td>4.73 – 5.00</td>
</tr>
<tr>
<td>(n = 181)</td>
<td>I was prepared for the presentation.</td>
<td>4.68 - 5.00</td>
</tr>
<tr>
<td></td>
<td>I felt the PowerPoint presentation held the students’ attention.</td>
<td>4.48 - 4.78</td>
</tr>
<tr>
<td></td>
<td>I felt that the activities held the students’ attention.</td>
<td>4.25 - 5.00</td>
</tr>
<tr>
<td></td>
<td>I felt we had a good amount of time to do everything.</td>
<td>4.00 - 5.00</td>
</tr>
<tr>
<td><strong>Teachers</strong></td>
<td>Peer leaders effectively delivered the Project SASS materials.</td>
<td>4.88 - 5.00</td>
</tr>
<tr>
<td>(n = 54)</td>
<td>Peer leaders effectively provided information on sun protection.</td>
<td>4.73 – 5.00</td>
</tr>
<tr>
<td></td>
<td>Peer leaders effectively used current &amp; appropriate technology.</td>
<td>4.72 – 5.00</td>
</tr>
<tr>
<td></td>
<td>Peer leaders effectively provided important information on how to do skin checks.</td>
<td>4.38 - 4.88</td>
</tr>
<tr>
<td><strong>Students</strong></td>
<td>I learned a lot from this presentation.</td>
<td>4.18 – 4.69</td>
</tr>
<tr>
<td>(n = 2,480)</td>
<td>I felt the presenters were knowledgeable &amp; friendly.</td>
<td>4.38 - 4.80</td>
</tr>
<tr>
<td></td>
<td>I think that Project SASS should continue to be taught in the future</td>
<td>4.31 – 4.84</td>
</tr>
</tbody>
</table>
* Study 3: Expand Project SASS into rural underserved areas in SE Arizona (majority Mexican American population)
  * Incidence increasing 1.5% annually
* Expand model to train high school students in health career clubs to deliver Project SASS to their peers
* Test the virtual version of Project SASS training and lesson in 18 trainees and 500 students.
* Test behavioral outcomes and school district policy change using a quasi-experimental longitudinal design over a 1 year period

Buller DB et al. Sustained use of an occupational sun safety program in a recreation industry: follow-up to a randomized trial on dissemination strategies. *TBM* 2015;5:361-371


