How Do We Measure Research Use In Knowledge Translation?

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Outline

• Introduction
• KT theories and measurement generally
• Measuring research use - how hard can it be?
• Some history
• What do we know?
• A program focused on research use and context
• Summary thoughts
Introduction

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In my longitudinal research program we develop solutions for improving the quality of care and quality of life/end-of-life for nursing home residents, for enriching the work life of their caregivers, and for enhancing system efficiencies and effectiveness. Findings from the last 10 years of our program point to: (1) the central importance of context in both theory development and successful use of research and other knowledge forms in practice, (2) the emerging role of facilitation as an important strategy to improve knowledge translation, and (3) the importance of sustainability, spread and scale-up of innovations to improve quality of care.

Background

Undergr – University of New Brunswick
Master’s – University of Alberta
Doctoral – University of Alberta
Post doc – Institute of Clinical Evaluative Sciences (ICES) & University of Toronto
KT Theories no longer scarce…

For example,

- Consolidated Framework For Implementation Research (CFIR), Damschroder et al (2009)
- Theoretical Domains Framework (TDF), Francis, Finch, Michie and others (2012 and forward)
- Normalization Process Theory (NPT), May et al (2009 and forward)
- Promoting Action on Research Implementation in Health Services (PARIHS), Kitson et al 1998 and forward
- Diffusion of Innovation, Everett Rogers (1962 and forward)
Diffusion of Innovation Theory

Elements
• The innovation
• Communication channels
• Time
• Social system

Influences – attributes of
• Innovation
• Organizations
• individuals
Rogers’ attributes of an innovation

1. Relative advantage
2. Compatibility
3. Complexity
4. Trialability
5. Observability
What remains scarce are good measures

Two examples…

Developing measures from:
- Survey
- Interview
- Admin’ve data
- Diffusion?
- Adoption?
- Implementation?

Figure 1. Greenhalgh and colleagues (2004) model of Implementation processes.
Alberta Context Tool

- Worked with the PARIHS framework where favourable context + strong facilitation + robust evidence increase research implementation
- Focused on context
- Operationalized the three core PARIHS constructs (leadership, culture, evaluation) and augmented with five others (social capital, organizational slack, formal interactions, informal interactions, resources)
- Used the Standards approach to build an evidence case for validity

Measuring the dependent variable

- What is the dependent variable?
  - Clinician behaviour or client outcome?
  - Clinician behaviour and client outcome?

- Why both matter – getting inside the black box

- When it is clinician behaviour how do we acquire the measure?

- Self-report vs. observation vs. chart extraction vs. ?
Some History

- Rich RF: Measuring knowledge utilization processes and outcomes.
Their main messages

Main message: a need for conceptual clarity and pluralism in measurement

- **Weiss** argued for specific foci (i.e., focus on specific studies, people, issues, or organizations) when measuring knowledge utilization.

- **Dunn** proposed a linear four-step process for measuring knowledge utilization: conceptualization (what is knowledge utilization and how it is defined and classified); methods (given a particular conceptualization, what methods are available to observe knowledge use); measures (what scales are available to measure knowledge use); and reliability and validity. Urged greater emphasis on step four (reliability, validity).

- **Rich** offered a comprehensive overview of issues influencing knowledge utilization across disciplines. Emphasized the complexity of the measurement process, suggested knowledge utilization may not always be tied to a specific action, and may exist as more of an omnibus concept.
Their main messages

They point to a persistent and unresolved problem – an inability to robustly measure research utilization – a challenge to those who rely on such measures to evaluate the uptake and effectiveness of research based practices to improve patient and organizational outcomes...

- Measuring research use important to the design and evaluation of such interventions
- Research use commonly assumed to have a positive impact on patient outcomes (by assisting with eliminating ineffective and potentially harmful practices, and implementing more effective (research-based) practices)
- Can only determine if outcomes are sensitive to varying levels of research use if we can first measure research use reliably and validly
- If patient outcomes are sensitive to the use of research and we do not measure it, we ignore a ‘black box’ of causal mechanisms that may influence research use
- The causal mechanisms within this black box can and should be used to inform the design of interventions that aim to improve patient outcomes by increasing the use of research
Our efforts


Squires et al (2011) findings from SR:

- Ambiguity in self-report research utilization measures
- Methodological problems
  - Despite an additional 10 years of research, 42 new measures and 65 new reports of self-report research utilization measures, these problems and others persist
- Lack of construct clarity
- Lack of measurement theory
- Lack of psychometric assessment

**Recommendation:** use of the *Standards* (the Standards for Educational and Psychological Testing)*

Hakkennes & Green. *Impl Sci* 2006 1:29
Measures for assessing practice change in medical practitioners

✧ Described outcome measures used in 228 studies of effectiveness of dissemination and implementation interventions for clinical guidelines
✧ Most trials reported change at the clinician level, < ⅓ measured whether any change in practice led to change in the patient health status
✧ Costs were the most reported measure of change at organizational level
✧ Medical record audit, computerized databases, and clinician questionnaire/interview most common ways of collecting data
✧ Few studies demonstrated the reliability and validity of the methods used
✧ Development of a common methodology for outcome assessment in studies of implementation would facilitate comparisons between studies and pooling of results
Table 3. Methods used to collect outcomes for the different outcome measure categories

<table>
<thead>
<tr>
<th>Method</th>
<th>Measures of Patient Change</th>
<th>Surrogate Measures of Patient Change</th>
<th>Measures of Practitioner Change</th>
<th>Surrogate Measures of Practitioner Change</th>
<th>Organisational or Process Level Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical record audit</td>
<td>32%</td>
<td>29%</td>
<td>45%</td>
<td>0</td>
<td>5%</td>
</tr>
<tr>
<td>Computerised medical record audit</td>
<td>14%</td>
<td>9%</td>
<td>12%</td>
<td>0</td>
<td>1%</td>
</tr>
<tr>
<td>Medical practitioner interview/survey/questionnaire</td>
<td>12%</td>
<td>2%</td>
<td>5%</td>
<td>100%</td>
<td>53%</td>
</tr>
<tr>
<td>Patient interview/survey/questionnaire</td>
<td>37%</td>
<td>4%</td>
<td>10%</td>
<td>0</td>
<td>5%</td>
</tr>
<tr>
<td>Computerised database</td>
<td>18%</td>
<td>26%</td>
<td>25%</td>
<td>0</td>
<td>18%</td>
</tr>
<tr>
<td>Log book/Department record/Register</td>
<td>2%</td>
<td>7%</td>
<td>9%</td>
<td>0</td>
<td>6%</td>
</tr>
<tr>
<td>Encounter form/Request slip/Diary</td>
<td>8%</td>
<td>3%</td>
<td>13%</td>
<td>0</td>
<td>13%</td>
</tr>
<tr>
<td>Other</td>
<td>14%</td>
<td>7%</td>
<td>7%</td>
<td>0</td>
<td>8%</td>
</tr>
<tr>
<td>Unclear</td>
<td>9%</td>
<td>14%</td>
<td>7%</td>
<td>0</td>
<td>6%</td>
</tr>
</tbody>
</table>

All numbers are percent of the total number of studies for that category
* Excludes 25 studies that measured cost in this category for which no method was recorded

Hrisos et al Impl Sci 2009 
Are there valid proxy measures of clinical behaviour? a systematic review

- Often not feasible or ethical to measure behaviour through direct observation, and rigorous behavioral measures are difficult and costly to use.
- SR to identify the current evidence relating to the relationships between proxy measures and direct measures of clinical behaviour.
- Assessed the accuracy of medical record review, clinician self-reported and patient-reported behaviour relative to directly observed behaviour.
- Results: Fifteen reports originating from 11 studies met the inclusion criteria.
  - Standardized patient in 6 reports
  - Trained observer in 3 reports
  - Audio/video recording in 6 reports
  - Multiple proxy measures of behaviour were compared in 5/15 reports
- Evidence base for three commonly used proxy measures of clinicians' behaviour very limited
Early work in our program
The “Determinants” studies
The conceptual structure of research utilization

- Single item measure
- Four types of research use: conceptual, instrumental, symbolic (persuasive) and overall based on early work of Weiss, Beyer & Trice, Stetler
- Changes over the years
- Question construction:
  - Definition
  - Examples
  - Single item
- Changes over the years: mostly in the examples until we began to work with care aides, now have the CRU scale which is a five item Likert scale

**Taxonomy of nurses’ sources of knowledge**

<table>
<thead>
<tr>
<th>SOURCES OF PRACTICE KNOWLEDGE FOR NURSES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOCIAL INTERACTIONS</strong></td>
</tr>
<tr>
<td>INFORMAL</td>
</tr>
<tr>
<td>NURSES</td>
</tr>
<tr>
<td>PEERS</td>
</tr>
<tr>
<td>CNS/ICU</td>
</tr>
<tr>
<td>PRECEPTOR/RESOURCE</td>
</tr>
<tr>
<td>UNIT MANAGER</td>
</tr>
<tr>
<td>STUDENTS</td>
</tr>
<tr>
<td>CLINICAL LEADER</td>
</tr>
<tr>
<td>PHYSICIANS</td>
</tr>
<tr>
<td>RESIDENTS</td>
</tr>
<tr>
<td>SPECIALTY GROUPS</td>
</tr>
<tr>
<td>ALLIED HEALTH</td>
</tr>
<tr>
<td>NON-PROFESSIONALS</td>
</tr>
<tr>
<td>PATIENT</td>
</tr>
<tr>
<td>PATIENT'S FAMILY</td>
</tr>
<tr>
<td>CONFERENCES</td>
</tr>
<tr>
<td>SEMINARS</td>
</tr>
<tr>
<td>WORKSHOPS</td>
</tr>
<tr>
<td>SHORT COURSES</td>
</tr>
<tr>
<td>IN-SERVICE</td>
</tr>
<tr>
<td>INSTITUTION-BASED</td>
</tr>
<tr>
<td>INTERNSHIP</td>
</tr>
<tr>
<td>ORIENTATION</td>
</tr>
<tr>
<td>ROUNDS</td>
</tr>
<tr>
<td>MEETINGS</td>
</tr>
<tr>
<td>JOURNALS CLUES</td>
</tr>
<tr>
<td>WHAT HAS WORKED/NOT WORKED BEFORE</td>
</tr>
<tr>
<td>PERSONAL PRACTICE EXPERIENCE</td>
</tr>
<tr>
<td>PERSONAL PRACTICE RESEARCH</td>
</tr>
<tr>
<td>INTRAPERSONAL</td>
</tr>
<tr>
<td>DOCUMENTS</td>
</tr>
<tr>
<td>UNIT-BASED</td>
</tr>
<tr>
<td>PHYSICIAN'S ORDERS</td>
</tr>
<tr>
<td>CHARTS</td>
</tr>
<tr>
<td>DOCUMENTATION</td>
</tr>
<tr>
<td>POLICY &amp; PROCEDURES</td>
</tr>
<tr>
<td>VIDEO &amp; OTHER MEDIA</td>
</tr>
<tr>
<td>NEWSLETTERS</td>
</tr>
<tr>
<td>COMMUNICATION BOOK</td>
</tr>
<tr>
<td>BULLETIN BOARD</td>
</tr>
<tr>
<td>INTERNET</td>
</tr>
<tr>
<td>PERSONAL BELIEFS</td>
</tr>
<tr>
<td>BASIC EDUCATION</td>
</tr>
<tr>
<td>COMMON SENSE</td>
</tr>
</tbody>
</table>

### 7 Unit Comparison (early 2000’s)

<table>
<thead>
<tr>
<th>Information Source</th>
<th>Ranking by Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unit 1</td>
</tr>
<tr>
<td>Individual patient</td>
<td>3</td>
</tr>
<tr>
<td>Intuitions</td>
<td>8</td>
</tr>
<tr>
<td>Personal experience</td>
<td>1.5</td>
</tr>
<tr>
<td>Nursing school</td>
<td>1.5</td>
</tr>
<tr>
<td>Physicians discussions w ns</td>
<td>9</td>
</tr>
<tr>
<td>Physician’s orders</td>
<td>7</td>
</tr>
<tr>
<td>Medical journals</td>
<td>15</td>
</tr>
<tr>
<td>Nursing journals</td>
<td>13</td>
</tr>
<tr>
<td>Nursing research journals</td>
<td>14</td>
</tr>
<tr>
<td>Textbooks</td>
<td>11</td>
</tr>
<tr>
<td>‘What has worked for years’</td>
<td>6</td>
</tr>
<tr>
<td>‘Ways we have always done it’</td>
<td>12</td>
</tr>
<tr>
<td>Fellow nurses</td>
<td>4.5</td>
</tr>
<tr>
<td>In-services in workplace</td>
<td>4.5</td>
</tr>
<tr>
<td>Policy &amp; procedure manuals</td>
<td>10</td>
</tr>
<tr>
<td>The media</td>
<td>16</td>
</tr>
</tbody>
</table>

## Patterns of research use

### Mapping of correspondence analysis results onto unit groups based on research utilization scores

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>Low Group</th>
<th>Medium Group</th>
<th>High Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influence of students</td>
<td>Units 1 &amp; 4</td>
<td>Units 3 &amp; 5</td>
<td>Units 2, 6, &amp; 7</td>
</tr>
<tr>
<td>Organizational support</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>People support</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resequencing</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Attitude</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuing education</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Critical thinking</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Creativity</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Efficiency</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Authority</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beliefs</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questioning behavior</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Intent</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coworker support</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Total PRN score</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Translating Research in Elder Care
An Applied Program of Research

Aim: System change that enables sustainable improvements in quality of care, quality of life and quality of end of life for frail, vulnerable residents and quality of work life for their care providers in residential LTC settings
The intent of our work is to develop practical solutions for improving the quality of care provided to LTC residents, for enriching the work life of their caregivers, and for enhancing system efficiencies and effectiveness.
Nursing home study (TREC)
Context, KT linked to RAI-MDS 2.0 outcomes: pain management, dementia behavior management, falls reduction, and other RAI-MDS 2.0 derived outcomes - in 36 NH’s (AB, SK, MB)

Facilitating the Implementation of Research Evidence
Context, KT linked to uptake of continence guidelines in Nursing Homes in five European countries

OPTIC study (Transitions: NH-EMS-EDs in AB & BC)
Context, RAI-MDS 2.0 data linked to transitions (e.g., EMS, ED and return to nursing home times and transition outcomes)

SCOPE study (Quality & Safety in NHs: AB & BC)
Context, KT, change/facilitation/SHN! intervention targeting care aides and linked to RAI-MDS 2.0 outcomes

CFI: (the infrastructure)
Ongoing development and enhancement of the TREC longitudinal measurement system and Information Commons Platforms
Jan 2011 – first Canadian boomer turned 65
Jan 2021 – first boomer turns 75
Dec 2031 – last boomer turns 65
Dec 2041 – that first boomer is 95
Dec 2061 – that last boomer is 95
Dementia and LTC

- With longer life and an increase in people with dementia come dramatically increased requirements for residential long-term care (nursing home) and other supportive living environments.
- Dementia diagnoses account for up to 80% of admissions to nursing homes.
- 70% of all individuals diagnosed with dementia in the USA will die in a nursing home\(^1\).
- In Europe this figure ranges from 50% (Wales) to 92% (Netherlands)\(^2\).

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Quality gaps

- Preventable adverse events (e.g., injury falls, pressure ulcers, untreated pain, inappropriate hospitalization….)
- Undiagnosed and/or inadequately treated mental health conditions
- Inappropriate medication practices
- Excess disability (e.g., moving, eating, hearing…)
- Cultural (in)competence (ethnic, religious, gender, sexual orientation, …)
- Spirituality gaps
- Quality of life and Quality of end of life gaps
- etc. . . . .
The TREC Projects
(2007–2012)

Project 1: An observational study
Project 2: A series of case studies
Project 3: The feedback projects
Pilots planned (3)
Pilots unplanned (5)

36 NHs in AB, SK, MB
Data Sources

1. The TREC survey (staff outcomes)
   - Care aides (~3000)
   - Regulated providers (~500)

2. Facility surveys (36)

3. Unit surveys (103)

4. RAI-MDS 2.0 (resident outcomes)
   a. From Oct 2007 to present
   b. ~125,000 records
Selected Findings

• Context (as a composite) is favourably associated with:
  – Instrumental and conceptual research use
  – Job and vocational satisfaction
  – Mental and physical health

• Feedback (the PARIHS evaluation element) and formal and informal interactions are particularly important and favourably associated with best practice use

• Regulated and unregulated staff groups need, use, share and value knowledge differently and for a system to function well the channels between these groups must be open and two way (Rogers’ social system, communication channels)

• Where we conduct our QI work and where we measure most constructs matters – whole organization vs. Microsystems
Summary thoughts

✓ Use relevant KT and related theory for intervention design, and evaluation
✓ Select robust measures, try to avoid the need to embark on developing measures if it is not a genuine interest you have
✓ If you do undertake to develop measures work with the Standards
✓ Pay attention to the attributes of your “innovation”
Summary thoughts (cont’d)

✔ Realize you are dealing with complex adaptive systems*

✔ Match strategies and interventions to the nature and structure of the work of target audience - pay attention to processes inherent in complex adaptive systems (e.g., sense-making)

✔ Engage the right levels of clinician and managerial decision-making and leadership

✔ Incorporate sustainability and spread

✔ Address scale-up if it is appropriate


Thank-you