

Knowledge Translation Measurement

Concepts, Strategies and Tools

Hosted by SEDL's Center on Knowledge Translation
for Disability and Rehabilitation Research (KTDRR)

How Do We Measure Research Use In Knowledge Translation?

Carole Estabrooks, RN, PhD, FCAHS, FAAN

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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**

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Introduction

Carole A Estabrooks, RN, PhD, FCAHS, FAAN

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

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KT Theories no longer scarce...

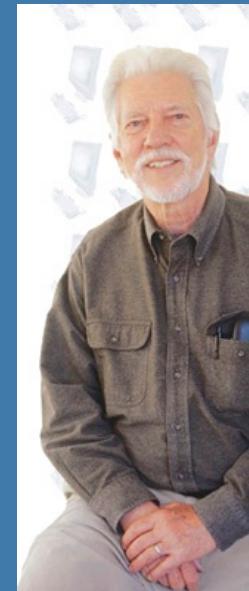
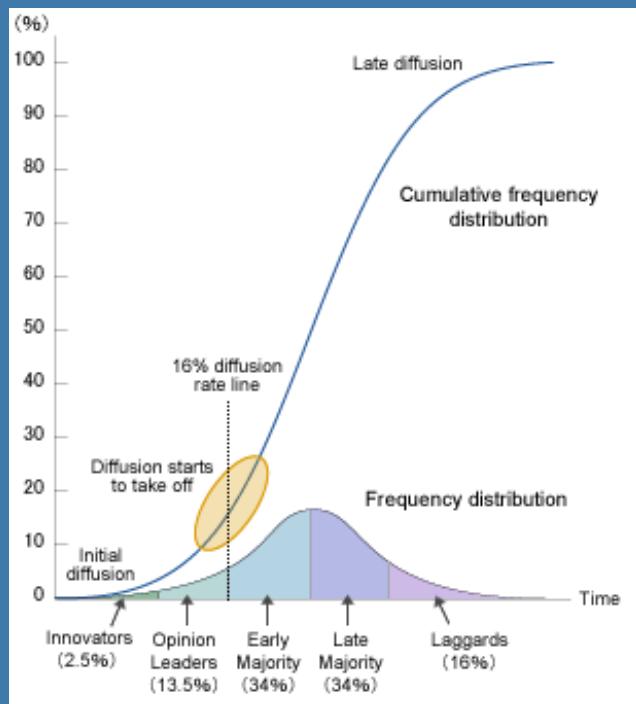
For example,

- **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



Ev Rogers
1931 - 2004

- ## Influences – attributes of
- Innovation
 - Organizations
 - individuals

Rogers' attributes of an innovation

- 1. Relative advantage**
- 2. Compatibility**
- 3. Complexity**
- 4. Trialability**
- 5. Observability**

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What remains scarce are good measures

Two examples...

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Cook, JM, et al. Measurement of a model of implementation for health care: Toward a testable theory. *Impl Sci*, 2012, 7:59

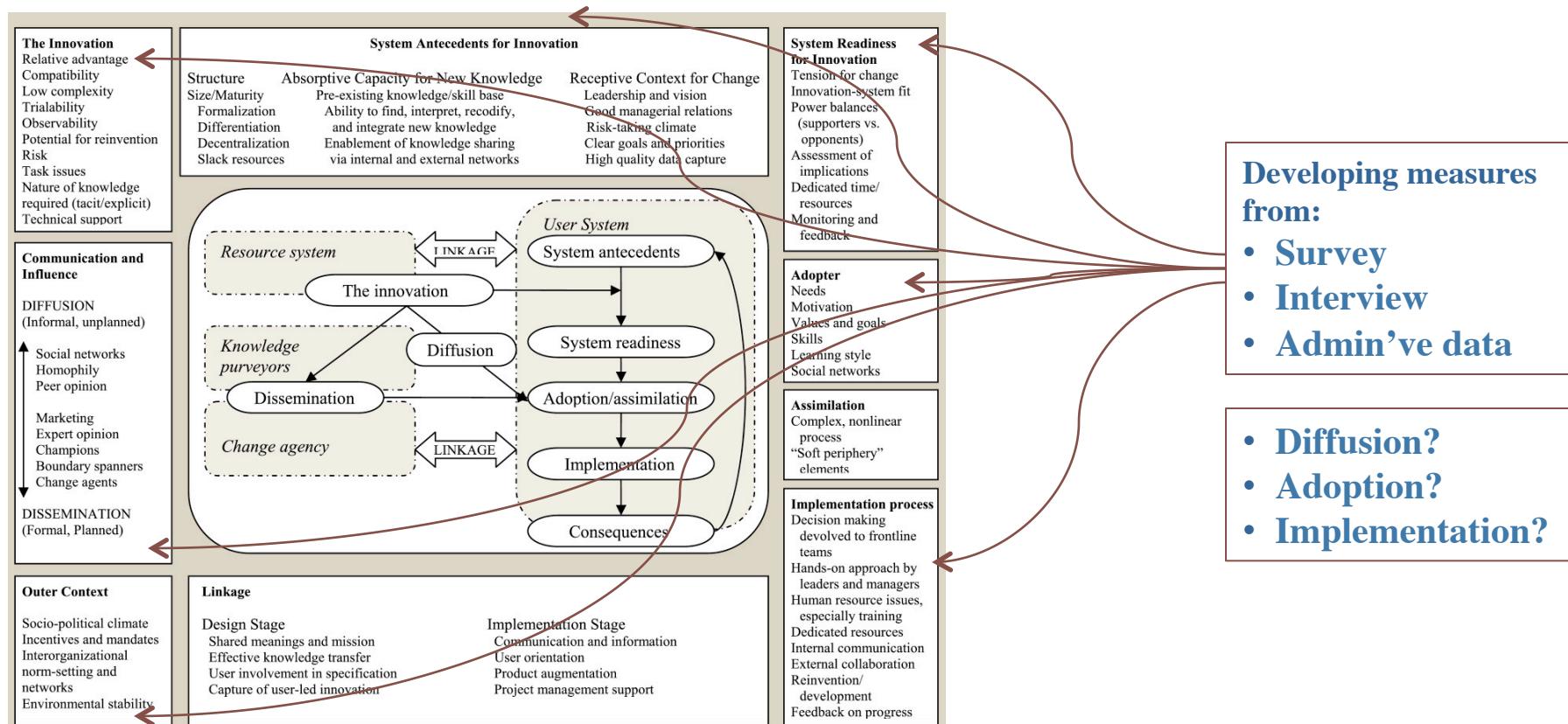


Figure 1. Greenhalgh and colleagues (2004) model of Implementation processes.

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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
 - Estabrooks, C.A., Squires, J.E., Cummings, G.G., Birdsell, J.M., Norton, P.G. (2009). Development and assessment of the Alberta Context Tool. *BMC Health Services Research*, 9:234
 - Estabrooks, C.A., Squires, J.E., Hayduk, L.A., Cummings, G.G., Norton, P.G. (2011). Advancing the argument for validity of the Alberta Context Tool with healthcare aides in residential long-term care. *BMC Medical Research Methodology*, 11:107.
 - Cummings, G.G., Hutchinson, A., Scott, S., Norton, P.G., Estabrooks, C.A. (2010). The relationship between characteristics of context and research utilization in a pediatric setting. *BMC Health Services Research*, 10:168.
 - Squires, J.E., Estabrooks, C.A., Scott, S., Cummings, G.G., Hayduk, L., Kang, S.H., Stevens, B. The influence of organizational context on the use of research by nurses in Canadian pediatric hospitals. *BMC Health Services Research*, 13:351.

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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. ?**



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Some History

- Dunn WN: Measuring knowledge use. **Knowledge: Creation, Diffusion, Utilization** 1983, 5(1):120-133.
- Rich RF: Measuring knowledge utilization processes and outcomes.
- Knowledge and Policy: International Journal of Knowledge Transfer and Utilization 1997, 3:11-24.
- Weiss CH: Measuring the use of evaluation. In Utilizing evaluation: Concepts and measurement techniques. Edited by: Ciarlo JA. Beverly Hills, CA: Sage; 1981:17-33.
- Estabrooks C, Wallin L, Milner M: Measuring knowledge utilization in health care. **International Journal of Policy Analysis & Evaluation** 2003, 1:3-36.

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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.

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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

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Our efforts

- Squires, JE, Estabrooks, CA, Hayduk, L, Gierl, M, Newburn-Cook, CV. (2014). Precision of the Conceptual Research Utilization Scale. *Journal of Nursing Measurement*, 22(1), xxx-xxx.
- Squires, JE. Estabrooks, CA, Newburn-Cook, CV, Gierl, M. (2011). Validation of the Conceptual Research Utilization Scale: An application of the Standards for Educational and Psychological Testing in Healthcare. *BMC Health Services Research*, 11:107.
- Squires, JE, Estabrooks, CA, O'Rourke, HM, Gustavsson, P, Newburn-Cook, CV, Wallin, L. (2011). A systematic review of the psychometric properties of self-report research utilization measures used in healthcare. *Implementation Science*, 6:83.
- Squires, JE, Hutchinson, AM, Boström, AM, O'Rourke, H, Cobban, S, Estabrooks, CA. (2011). To what extent do nurses use research in clinical practice? A systematic review. *Implementation Science*, 6:21.
- Estabrooks, CA, Squires, JE, Strandberg, E, Nilsson-Kajermo, K, et al. (2011). Towards better measures of research utilization: A collaborative study in Canada and Sweden. *Journal of Advanced Nursing*, 67(8), 1705-1718.
- Midodzi, WK, Hayduk, L, Cummings, GG, Estabrooks, CA, Wallin, L. (2007). An alternative approach to addressing missing indicators in parallel datasets: Research utilization as a phantom latent variable. *Nursing Research*, 56(4), Suppl 1, S47-S52.
- Wallin, L, Estabrooks, CA, Midodzi, W, Cummings, GG. (2006). Development and validation of a derived measure of research utilization by nurses. *Nursing Research*, 55(3), 149-160.
- Estabrooks, CA, Wallin, L, Milner, M. (2003). Measuring knowledge utilization in health care. *International Journal of Policy Evaluation & Management*, 1(1), 3-36.
- Estabrooks, CA. (1999). The conceptual structure of research utilization. *Research in Nursing & Health*, 22, 203-216.

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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)*

*American Educational Research Association, American Psychological Association, National Council on Measurement in Education: *Standards for Educational and Psychological Testing*. Washington, D.C.: American Educational Research Association; 1999.

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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, < ½ 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

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Table 3.
Methods used to collect outcomes for the different outcome measure categories

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

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

Hakkennes & Green. *Implementation Science* 2006 1:29 doi:10.1186/1748-5908-1-29

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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

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*Early work in our program
The “Determinants” studies*

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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
-
- ❖ Estabrooks, CA. The conceptual structure of research utilization. *RINAH*, 1999, 22: 203-21
 - ❖ Squires, JE. Estabrooks, CA, Newburn-Cook, CV, Gierl, M. (2011). Validation of the Conceptual Research Utilization Scale: An application of the Standards for Educational and Psychological Testing in Healthcare. *BMC Health Services Research*, 11:107.
 - ❖ Squires, JE, Estabrooks, CA, Hayduk, L, Gierl, M, Newburn-Cook, CV. (2014). Precision of the Conceptual Research Utilization Scale. *Journal of Nursing Measurement*, 22(1).

Taxonomy of nurses' sources of knowledge

SOURCES OF PRACTICE KNOWLEDGE FOR NURSES										
		SOCIAL INTERACTIONS				EXPERIENCE				
		INFORMAL		FORMAL				DOCUMENTS		INTRA-PERSONAL
PEERS	NURSES	PATIENT	NON-PROFESSIONALS	DISCIPLINE-BASED	INSTITUTION-BASED	JOURNALS CLUBS	WHAT HAS WORKED/NOT WORKED BEFORE, PERSONAL PRACTICE EXPERIENCE	BOOKS, JOURNALS, PREVIOUS RESEARCH	OFF-UNIT	INTUITION
CNS/CNE		PATIENT'S FAMILY	CONFFERENCES	WORKSHOPS	SHORT COURSES	IN-SERVICE	INTERNSHIP	ROUNDS	MEETINGS	INTERNET
PRECEPTOR/RESOURCE		SEMINARS				ORIENTATION				INTUITION
UNIT MANAGER		CONFERENCE								PERSONAL BELIEFS
STUDENTS										BASIC EDUCATION
CLINICAL LEADER										COMMON SENSE
PHYSICIANS										
RESIDENTS										
SPECIALTY GROUPS										
ALLIED HEALTH										

Estabrooks, C.A., Rutakumwa, W., O'Leary, K., Profetto-McGrath, J., Milner, M., Levers, M.J., Scott-Findlay, S. (2005). Sources of practice knowledge among nurses. *Qualitative Health Research, 15(4)*, 460-476.

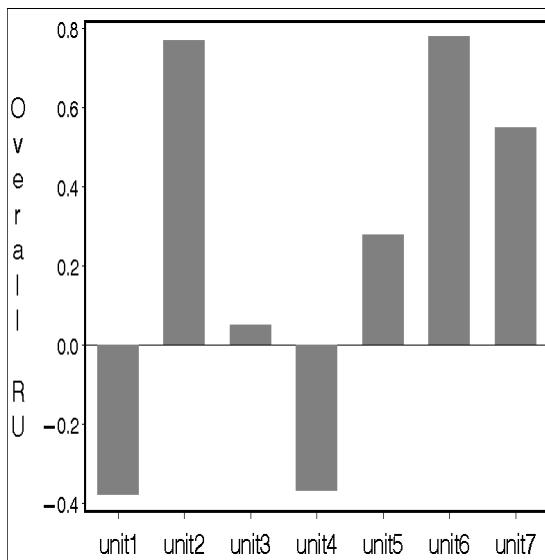
7 Unit Comparison (early 2000's)

Information Source	Ranking by Means						
	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7
Individual patient	3	1	1.5	2	2	1	2.5
Intuitions	8	8	4	5	8	7	4.5
Personal experience	1.5	2	1.5	1	1	2	1
Nursing school	1.5	4	3	3	6.5	9	8
Physicians discussions w ns	9	5.5	7	7	6.5	3	9
Physician's orders	7	7	9.5	7	9.5	8	12.5
Medical journals	15	15	16	14.5	15	14	15
Nursing journals	13	12	13	11	13	10	10
Nursing research journals	14	13	14	16	15.5	13	11
Textbooks	11	9	11	12.5	11	12	14
'What has worked for years'	6	11	7	7	4.5	11	4.5
'Ways we have always done it'	12	14	12	10	12	15	12.5
Fellow nurses	4.5	5.5	7	4	3	6	7
In-services in workplace	4.5	3	5	12.5	4.5	5	2.5
Policy & procedure manuals	10	10	9.5	9	9.5	4	6
The media	16	16	15	14.5	15.5	16	16

Estabrooks, C.A., Chong, H., Brigidear, K., Profetto-McGrath, J. (2005). Profiling Canadian nurses' preferred knowledge sources for clinical practice. *Canadian Journal of Nursing Research*, 37(2), 118-141.

Patterns of research use

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



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

Estabrooks, C.A., Scott-Findlay, S., Squires, J.E., Stevens, B., O'Brien-Pallas, L., Watt-Watson, J., Profetto-McGrath, J., McGilton, K., Golden-Biddle, K., Lander, J., Donner, G., Boschma, G., Humphrey, C.K., Williams, J. (2008). Patterns of research utilization on patient care units. *Implementation Science*, 3:31.

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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



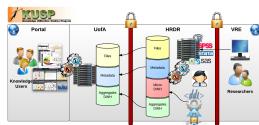
OPTIC study (Transitions: NH-EMS-EDs in AB & BC)

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



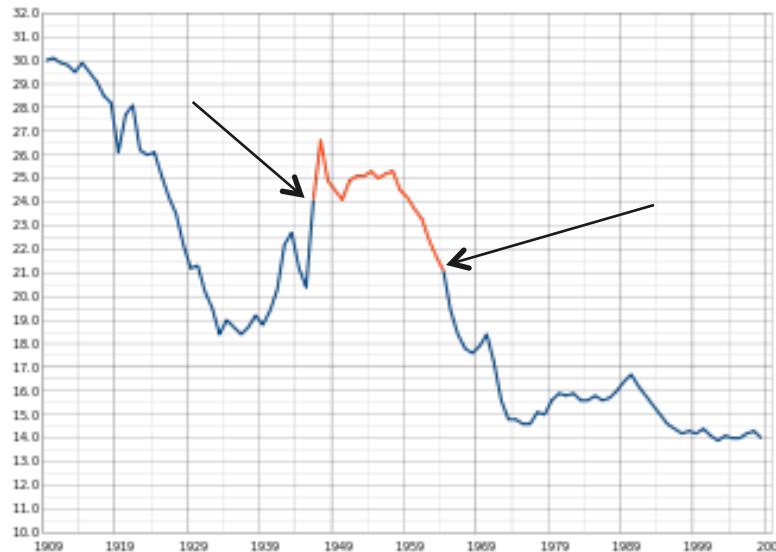
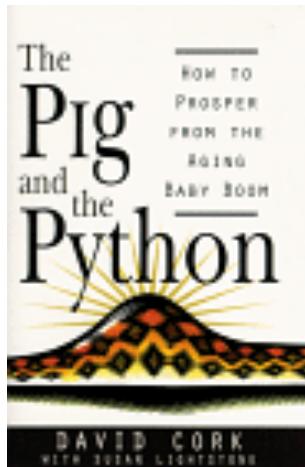
CFI: (the infrastructure)

Ongoing development and enhancement of the TREC longitudinal measurement system and Information Commons Platforms

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- 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

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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 home¹
- In Europe this figure ranges from 50% (Wales) to 92% (Netherlands)²

¹Mitchell , et al. (2005). A national study of the location of death for older persons with dementia. *JAGS*. 53:299-305

²Houttekier, et al. (2010). Place of Death of Older Persons with Dementia. A Study in Five European Countries. *JAGS*, 58:751-56.

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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

• Why care aides?

• Why units?

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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

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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”

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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

* Lanham HJ, Leykum LK, Taylor BS, McCannon CJ, Lindberg C, Lester RT. How complexity science can inform scale-up and spread in health care: Understanding the role of self-organization in variation across local contexts. *Social Science & Medicine*, 2013;93:194-202

Anderson RA, Issel LM, McDaniel RRJ. Nursing homes as complex adaptive systems: Relationship between management practice and resident outcomes. *Nursing Research*, 2003;52:12-21.

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Thank-you

