



UNDERSTANDING WHOLE SYSTEMS CHANGE IN HEALTHCARE: THE CASE OF EMERGING EVIDENCE-INFORMED NURSING SERVICE DELIVERY MODELS

FINAL REPORT FOR CHSRF REISS
PROGRAM #RC2-1266-06

SEPTEMBER 2010

PRINCIPAL INVESTIGATORS

NANCY EDWARDS, RN, PHD, FAHS
PROFESSOR, UNIVERSITY OF OTTAWA

DORIS GRINSPUN, RN, PHD, LLD(HON), O.ONT.
EXECUTIVE DIRECTOR, REGISTERED NURSES'
ASSOCIATION OF ONTARIO (RNAO)

This document is available at www.chsrf.ca.

This research report was submitted to the Canadian Health Services Research Foundation and has not been altered.

Funded through an agreement with the Government of Canada, CHSRF is an independent, not-for-profit corporation with a mandate to promote the use of evidence to strengthen the delivery of services that improve the health of Canadians. The views expressed in this report are those of the authors and do not necessarily represent the views of CHSRF or the Government of Canada.

Understanding Whole Systems Change in Healthcare: The Case of Emerging Evidence-informed Nursing Service Delivery Models © 2011 Canadian Health Services Research Foundation.

All rights reserved. This publication may be reproduced in whole or in part for non-commercial purposes only and on the condition that the original content of the publication or portion of the publication not be altered in any way without the express written permission of the CHSRF. To seek this permission, please contact info@chsrf.ca. To credit this publication please use the following credit line: "Reproduced with the permission of the Canadian Health Services Research Foundation, © 2011."

CHSRF

1565 Carling Avenue, Suite 700
Ottawa, Ontario K1Z 8R1

Email: info@chsrf.ca
Telephone: 613-728-2238
Fax: 613-728-3527

CO-INVESTIGATORS

Angela Downey	Associate Professor, University of Victoria
Ali Dastmalchian	Professor and Dean of the Faculty of Business, University of Victoria
Irmajean Banjok	Director, International Affairs and Best Practice Guideline Program and Centre for Professional Nursing Excellence, Registered Nurses' Association of Ontario
Whitney Berta	Associate Professor, University of Toronto
Sheila Block	Registered Nurses' Association of Ontario
Barbara Davies	Professor, University of Ottawa
Kathryn Higuchi	Associate Professor, University of Ottawa
Jenny Ploeg	Associate Professor, McMaster University
Jennifer Skelly	Associate Professor, McMaster University
Judith Ritchie	Associate Director for Nursing Research, McGill University Health Centre and Professor (part-time), School of Nursing
Tazim Virani	Principal, Tazim Virani and Associates
Ian Graham	Associate Professor, University of Ottawa ¹
Ariella Lang	Research Scientist, VON Canada
Heather McConnell	Associate Director, International Affairs and Best Practice Guidelines Program, Registered Nurses' Association of Ontario
Ann Lynch	Associate Director General of Clinical Operations, McGill University Health Centre
Patricia Marck	Associate Professor, University of Alberta
Cécile Michaud	Associate Professor, Université de Sherbrooke, Campus de Longueuil
Suresh Kalagnanam	Associate Professor, University of Saskatchewan
Kim Jarvi	Senior Economist, Registered Nurses Association of Ontario

DECISION-MAKING PARTNER - LEAD

Doris Grinspun	Executive Director, Registered Nurses' Association of Ontario
----------------	---

PROJECT ADVISORY COMMITTEE

Doris Grinspun	Executive Director, Registered Nurses' Association of Ontario (RNAO)
Nancy Edwards	Professor, University of Ottawa
Carmen Millar	Director of Nursing, Hôpital Charles LeMoyne
Heather Lashinger	Professor and Associate Director of Nursing Research, University of Western Ontario
Sandra MacDonald	Executive Director, Office of Nursing Policy, Health Policy Branch, Rencz Health Canada
Judith Shamian	President and CEO, VON Canada and President Elect of the CNA

¹ Ian Graham withdrew from the study due to change in position.

PROJECT EXECUTIVE COMMITTEE

Nancy Edwards	Professor, University of Ottawa
Whitney Berta	Associate Professor, University of Toronto
Judith Ritchie	McGill University Health Centre
Jenny Ploeg	Associate Professor, McMaster University
Angela Downey	Associate Professor, University of Victoria

ACKNOWLEDGEMENTS

The research team gratefully acknowledges the following for their support for this program of research:

- ▶ Our funding agencies: Canadian Health Service Research Foundation, Registered Nurses' Association of Ontario, Government of Ontario, University of Ottawa. In-kind funding was provided by the Government of Ontario (PREA award Dr. B. Davies, CHSRF Chair Award, Dr. N. Edwards), Canadian Nurses Association, SCO Health Service, Hôpital Charles LeMoyné. No endorsement by our funders is intended or should be inferred.
- ▶ The administrators, nursing executives, and nursing staff of organizations and others who participated in this study for their thoughtful insights, cooperation, and willingness to share their opinions and experiences.
- ▶ Members of the System Commons planning committee, particularly Tracy Carr, Dorothy Bonnenfant, and Margo Rowan.
- ▶ Members of the Symposium planning committee, particularly Katie Hoogeveen and Margo Rowan.
- ▶ The dedication of the following project staff and consultants: Margo Rowan (Principal, Rowan Health Policy Consulting, Ottawa, Ontario), Katie Hoogeveen, Hannah Shamji, Maureen Sullivan-Bentz, Andrea Perrier, Eileen Vilis, Dianne Hurren, Erin McQuaid.
- ▶ The enthusiastic involvement and contributions of post-doctoral fellows: Tracy Carr, Dominique Tremblay and Mary Ann Murray.
- ▶ The contributions of undergraduate and graduate students: Tammy Armstrong, Megan Greenough, Susan Eldred, Wendy Gifford and Kathleen Benjamin.

TABLE OF CONTENTS

KEY IMPLICATIONS FOR DECISION-MAKERS	1
EXECUTIVE SUMMARY	2
OVERVIEW OF THE PROGRAM OF RESEARCH.....	4
STUDIES UNDER THE PROGRAM OF RESEARCH.....	4
Study 1: Champions Promoting the Use of Best Practice Guidelines in Nursing.....	4
<i>Context</i>	4
<i>Implications</i>	5
<i>Approach</i>	5
<i>Results</i>	5
<i>Further research</i>	6
Study 2: Early Steps in Innovation: What takes a good idea further?	6
<i>Context</i>	6
<i>Implications</i>	7
<i>Approach</i>	7
<i>Results</i>	7
<i>Further research</i>	8
Study 3: Spreading Innovation—The Best Routes to Best Practices	8
<i>Context</i>	8
<i>Implications</i>	8
<i>Approach and results</i>	9
<i>Further research</i>	10
Study 4: Starting with Basics: Improving Communication to Improve Long-term Care	10
<i>Context</i>	10
<i>Implications</i>	10
<i>Approach</i>	11
<i>Results</i>	11
<i>Further research</i>	13
Study 5: A New Approach for Analyzing the Costs and Benefits of Spreading Nursing Innovations System-wide.....	13
<i>Context</i>	13
<i>Implications</i>	14
<i>Approach</i>	14
<i>Results</i>	14
<i>Further research</i>	16

PROGRAM OF RESEARCH FINDINGS	16
<i>Context</i>	16
<i>Implications</i>	16
<i>Approach</i>	16
<i>Results</i>	17
<i>Further research</i>	19
ADDITIONAL RESOURCES	20
<i>Web links</i>	20
<i>Presentations</i>	20
REFERENCES	20

KEY IMPLICATIONS FOR DECISION-MAKERS

Evidence-based nursing guidelines give information on providing care that will result in the best possible outcomes for patients, their families, organizations and the healthcare system as a whole. Getting them widely accepted, however, takes careful planning.

- 1) To get established, best practice nursing innovations require far-reaching change, where complex networks of individuals and organizations come together to make transformation happen.
- 2) Champions support and spread innovation by forming networks and motivating others to adopt best practices. They should come from every level in healthcare, from the front lines to leaders of the system overall.
- 3) Organizations need to create an environment where the use of evidence to inform nursing practice is a normal part of structures and daily process.
- 4) Best practice guidelines won't be adopted and spread unless your inter-professional teams can see their benefits and you have the resources (such as money, staff and policies) to support them.
- 5) Be prepared to test, adapt, modify and even discard innovations as you keep working toward improving care.
- 6) Timing is an important part of successful innovation. You'll need a flexible, co-operative approach to bring together leaders, support and networks across organizations and the whole system when the right time to introduce an innovation appears.
- 7) Quality-improvement programs are essential for adapting best practices to the context of an organization. Tracking, measuring and giving timely feedback (to everyone from decision-makers to practitioners to patients) on the impact of your innovations will get you the information you need to adjust your innovation and make it better.
- 8) Innovation efforts should always be evaluated. Those evaluations should include mixed models of variable costs, assessments of economies of scale and an expanded cost hierarchy to show the non-linear effects of scaling up best practice models.
- 9) There are lessons in both successful and failed efforts to introduce best practice guidelines. Studying them can help you plan for the complexities of spreading innovations across the system.

EXECUTIVE SUMMARY

The imperative to deliver the best care possible drives research on best practices in nursing, but what does it take to spread a guideline or recommendation from one or two units or organizations to a system-wide innovation that benefits all patients and providers and the healthcare system as a whole? What cost drivers and increased benefits come with spreading a best practice; and what supports, sustains or gets in the way of spreading evidence-informed change?

Those were the questions we set out to answer in our four-year program of research called *Evidence-Informed Models of Nursing Service*. Funded by the Canadian Health Services Research Foundation and other partners, the program’s goal was to improve understanding of how health systems introduce, support and spread evidence-informed innovations.

Researchers from across Canada participated in the five projects that made up our program of research, and its main focus was the best practice guidelines initiative of the Registered Nurses Association of Ontario (RNAO). Eight years after the association launched the project, the guidelines are being implemented across Canada and internationally. However, for these the longest (except for study 2, which actually looks at three innovations introduced in Ontario before RNAO launched its guideline initiative). We looked at nursing guidelines because nurses are with patients around the clock, in every sector of healthcare, and getting nurses to base their work on up-to-date, evidence-based practices, is central to delivering safe care and optimizing patient, organizational and system outcomes. The learnings of this study about spreading innovations applies to all healthcare professions and sectors.

Table 1 – Five studies to look at key steps to spreading best practices: *Focus, Design, Samples and Approaches*

Study Focus	Design	Sample	Approach
1 – The role of champions in spreading guidelines	Mixed methods, sequential, triangulation design	RNAO Champions and administrators	Interviews and surveys
2 – What factors make an organization better at innovating and make some innovations more likely to spread **	Retrospective case study involving three innovations: early postpartum discharge, minimal/least restraint, and needle exchange	Key informants: policy- and decision-makers, care providers, researchers	Interviews and document analysis
3 – Expanding spread within and across organizations	<i>Phase 1:</i> Secondary analysis of data from a previous study on long-term sustainability <i>Phase 2:</i> Exploratory qualitative case study	<i>Phase 1:</i> Key informants from sites <i>Phase 2:</i> Participants from one hospital and one community home care organization	<i>Phase 1:</i> Interviews, site visits, and document analysis <i>Phase 2:</i> Focus groups
4 – Using feedback to support change in long-term care	Mixed method randomized controlled trial using participatory action research	Long-term care facilities regulated by the Ontario ministry	Multiple in-depth interviews with staff from facilities

Study Focus	Design	Sample	Approach
5 – Benefit levers and cost drivers of spreading innovations system-wide	Identification of system-level structural cost drivers and benefit levers	N/A	Review of projects 1-4; review of costing literature; comparison of costing principles we developed with those used in previous economic analysis of RNAO Best Practice Guidelines

*** This project did not use RNAO Best Practice Guidelines*

Table 1 shows the wide range of research approaches workplaces used and the innovations we studied. Despite the variety of our research goals and the extent of data we collected, some factors that support innovation arose over and over. These are the essential facets of successful innovation:

- ▶ Communication, opportunities for discussion and education;
- ▶ Champions and leaders committed to introducing and supporting change;
- ▶ Aligning policies, processes and resources to accommodate and support change;
- ▶ Adapting innovations to suit the context of each organization;
- ▶ Involving staff at all levels in planning, introducing and adapting innovation;
- ▶ Monitoring results and giving timely feedback.

One of our most important lessons is that while many strategies for implementing evidence-informed change will work in single units or larger organizations, or even for the whole system, scaling-up an innovation is not just a question of doing more of the same in each organization. Approaches, effects and benefits can all shift with system-wide spread. We dedicated one of our five studies to analyzing the costs drivers and benefit levers of spreading nursing innovations system-wide, exploring what factors may come into effect when the whole system comes into play.

To illustrate what we learned from our five studies, we developed a model, that shows how spread takes place within organizations and at the system level. We found innovation may start in an organization, and move up to shift practice across the system, or be top-down. Innovation at different levels reinforces the development of evidence-informed models of care.

OVERVIEW OF THE PROGRAM OF RESEARCH

In this four-year program of research, we studied the emergence and spread of evidence-informed models of nursing across the healthcare system. We defined these evidence-informed models as transformative models for health services delivery, primarily delivered by or involving the work of nurses. Introducing these models, which can cross sectors, takes multiple strategies with support from decision-makers at organizational, regional and system levels. Promoting rapid uptake of evidence-based practices by practitioners and organizations entails focused implementation strategies within and between organizations.

Our objectives were to understand how evidence-based best practices are developed and diffused across the healthcare system; what cost drivers and benefit levers accompany the development, diffusion and spread of a best practice; and what factors support, sustain or impede intra-and inter-organizational system change. We took a whole-systems change perspective in our work, envisioning the innovations as multi-level, non-linear and multi-directional, with sustainable system adaptations (Edwards, Marck, Virani, Davies & Rowan, 2007; Greenhalgh, Robert, Bate, MacFarlane & Kyriakidou, 2005).

Most of the change models we studied are founded on the work of the Registered Nurses Association of Ontario (RNAO) Nursing Best Practice Guidelines initiative, except for the second project described in this report. It examined system-level diffusion of three healthcare innovations – early postpartum discharge, minimal/least restraints, and needle exchange programs – which were introduced in Ontario prior to the RNAO Nursing Best Guidelines initiative. Studying these three innovations helped us to develop a deeper understanding of system-level diffusion processes in fairly long-standing innovations, and also provided external validity and thereby strengthened the trustworthiness of the ideas and concepts emerging from our work with best practice guidelines.

Our team developed an overarching framework to guide this program of research (see Appendix A). This framework reflects theories from organizational science, diffusion research and a system change theory, and illustrates the primary focus for the complementary projects that comprised our work. In the sections that follow, we discuss each of our five studies presenting the context, implications, approach, results, and suggestions for further research. The overall program of research is then described, again outlining implications, approach, results and suggestions for further research.

STUDIES UNDER THE PROGRAM OF RESEARCH

Study 1: Champions Promoting the Use of Best Practice Guidelines in Nursing

Context:

Getting nurses to base their work on up-to-date, evidence-based practices, is central to delivering safe care and optimizing patient, organizational and system outcomes (Grinspun, Melnyk & Fineout-Overholt, 2010). To this end, RNAO has developed and supported the transfer and uptake of evidence-based best practice guidelines since 1999 (Grinspun, Virani & Bajnok, 2002). Getting the word out about new approaches to care and persuading people across the system to adopt

these requires multiple strategies. This study looked at whether having nurses act as champions encourages use of best practice guidelines, and which champion activities help most to spread methods for evidence-based care inside organizations and throughout the system as a whole.

Implications

Healthcare administrators who want to see widespread adoption of the most effective clinical practices for nursing can use nurse champions to encourage peers to follow best practice guidelines. In our study, most champions had more than 20 years of experience in acute or long-term care, and were most effective when they offered education and mentoring, acted as “persuasive practice leaders” at interdisciplinary committees and tailored plans for implementing guidelines to their own organization.

Approach

We used a mixed-method, sequential, triangulation design for our qualitative Phase 1, followed by the quantitative Phase 2. In Phase 1 we taped telephone interviews with two groups of champions between February and July of 2006. Group A champions were from across Ontario and had attended a two-day RNAO best practice guideline workshop between June 2002 and June 2004. Group B were from across Canada and attended similar one-day workshops offered by RNAO during February and March of 2004, with funding from Health Canada. We chose participants who held different types of positions in various practice settings. They told us about their work and how, as champions, they influenced diffusion of best practice guidelines. We also asked about what helped and hindered promoting guidelines. Twenty-three of the 26 people we approached (88.5%) participated in the qualitative interviews, 12 from Group A and 11 from Group B. Afterwards, we developed a coding framework based on line-by-line reading of transcripts of the interviews. We divided the information we gathered into main and subcategories by reviewing the data within and across codes. We used several team members to verify the coding.

Next, we developed a survey for champions and administrators based on research literature and what we had learned in Phase 1. Questions included: characteristics of champions and their organizations; impact of champions; and facilitators and barriers to champions. A total of 885 people who had completed the RNAO workshop between January 2002 and December 2006 were invited by email to complete the survey; after two reminders, the survey was completed by 191/885 (21.6%) of champions and 41/110 (37.3%) of administrators.

Results

It takes effective implementation strategies to spread a best practice guideline successfully. Champions—people who are committed to promoting best practices and encourage others to make a commitment to evidence-based practice—are known to be effective. To help them spread good practices for the optimal health of patients, organizations need to create an environment where their knowledge and skills can flourish as part of regular activities. Champions also need ongoing education and support to maximize their contribution to transferring knowledge, developing policy, acting as leaders and mentors and helping with research and evaluation.

Most interview and survey participants were female, employed full-time and had worked in nursing over 20 years. The three best practice guidelines they were most commonly involved with were assessing and preventing pressure ulcers, assessing and managing pain, and preventing falls in older adults.

We found champions influence the use of best practice guidelines most readily through sharing information about guidelines, specifically through education and mentoring, being persuasive leaders at interdisciplinary committees and by tailoring strategies for introducing the guidelines to their own organizations. They did so by exploring and monitoring practices, and pointing out places policy and documents had to be changed to incorporate guidelines.

We found no statistically significant differences on the survey between the perceptions of champions and administrators, or among the three types of champions—managers, educators/clinicians and front-line staff. Spreading guidelines inside an organization depended on using effective implementation strategies, and spreading them beyond was related to internal change. The most effective implementation strategies were sharing information, raising awareness, and mentoring staff. Champions did better in organizations that had nurse educators, members of upper management and a committee all dedicated to supporting the guidelines. Workload and time constraints and lack of staff and financial resources were the biggest barriers to successfully spreading best practice guidelines.

Further research

We would like to know if characteristics of champions, such as their position or seniority, make them more effective? Are nurse educators or nurse managers, because of their formal position of power within the organization, more effective than front-line nurses in getting guidelines adopted? What organizational supports are essential for nurse champions to succeed? How important is managerial or leadership support? Is formal recognition of champions important to their success? Another line of research concerns what constitutes a “critical mass” of champions for optimal impact? How do champions advance from novice to expert? We would also like to explore the concept of “tailoring” guidelines. What types of decisions go into tailoring guideline implementation strategies to fit a local context or multiple sites, to increase the likelihood they’ll be adopted? We would also like to see more study on the organizational influences that help champions lead the spread of guidelines.

Study 2: Early Steps in Innovation: What takes a good idea further?

Context

Bringing evidence-informed practices into use across the healthcare system is important for patients, practitioners and other decision-makers. Innovations are diffused as the idea is shared across groups ranging from single units to complex networks of multiple organizations. Our primary research questions were:

- 1) What factors set organizations apart in their capacity to apply or produce evidence-informed nursing service delivery innovations that are viable beyond the boundaries of their founding organization or unit?
- 2) What gives some innovations higher potential to be diffused across the system, and what factors detract from that potential?

We examined three clinical innovations that predate the Registered Nurses’ Association of Ontario Best Practice Guidelines Program. We looked at the early histories of these innovations—the beginning and middle stages—to learn about what makes some innovations spread better than others throughout the healthcare system. We hoped to validate conditions for emergence and optimal diffusion of an emerging innovation.

Implications

Diffusion can occur naturally, but concerted diffusion—where there are conscious efforts to spread information—is of particular interest to decision-makers as it serves to speed up processes to improve quality of care, as well as the performance and effectiveness of organizations and whole systems.

Successfully introducing evidence-informed practices begins with acknowledging and discussing differences in values, expectations, goals and opinions among stakeholders.

Collaborative approaches aim to establish common interests and an alignment of goals to advance evidence-informed practices.

Making connections at all levels, from one front-line provider or professional group to another, between institutions and community organizations and from one level of government to another can help overcome lack of support for change among stakeholders.

Winning support for innovations requires leaders who are open and receptive to research evidence, support change, and are effective at translating evidence into day-to-day practices. Backing from high-level leaders is required to create an environment where evidence-informed practices are accepted and spread and organizational changes are made to facilitate their consistent, continuous and sustained uptake.

Ensuring appropriate resources takes careful planning with internal and external stakeholders to assess what's necessary to implement and sustain evidence-informed practices.

Approach

Our research used a retrospective case study design, with values, key informant interviews and document analysis. We looked at three health policy areas: early postpartum discharge, minimal/least restraints and needle exchange program. These were chosen based on their level of diffusion, as well as their relevance to clinical nursing practice and how long they had been in use. We used theoretical and snowball sampling techniques to identify key informants who had been directly involved in developing and implementing these health policy changes including researchers, clinicians and policy-makers.

Key informants participated in semi-structured, one-to-one one hour telephone interviews between September 2008 and December 2009. We asked about their experiences with the development and implementation of the innovation, key success factors, barriers and what lessons they could share. Seven people were interviewed for post-partum discharge, seven for minimal/least restraints and five for needle exchange. Interviews were audiotaped, transcribed, coded and categorized into major themes and sub-themes. Timelines developed from the analysis, which reflected the emergence of each of these innovations over time, were sent to all interviewees for validation. Validation led to modest additions or revisions to the timelines.

Results

Champions and advocates are important at every level in an organization and in the system to advance and sustain momentum around evidence-informed practice changes, communicating its importance to staff, and showing what it means for organizations and whole system outcomes.

Differences among stakeholders in their values, beliefs and opinions were a key challenge to

innovation diffusion. They should be dealt with openly, through formal group mechanisms, to arrive at a consensus on values and aims, before planning the introduction of the innovation. Maintaining group dialogue throughout the change process facilitates uptake and spread of evidence-informed innovations.

All three health policy areas we studied struggled with lack of human resources, time and opportunities for education. Lack of funds and weak or opposing legislation affected all three innovations. Speeding up diffusion on an innovation requires a plan that includes an assessment of system readiness (see Appendix B for Stages of System Readiness). Indicators of system readiness include the presence of sufficient evidence, accumulated expertise, quality improvement programs and system level advocates.

Further research

We would like to see more research on both how to identify evidence-informed innovations that have a high potential to change the system, and also on how to increase people's capacity to develop innovations.

More work should be done on long-range resource planning for stakeholders that would increase adoption and spread of effective innovations.

Study 3: Spreading Innovation—The Best Routes to Best Practices

Context

High-quality health services offer patients the most relevant and up-to-date evidence-informed interventions available. Best practice guidelines are useful summaries of up-to-date research with recommendations for clinical practice and health services changes (Grinspun, Virani & Bajnok, 2002). Despite their importance, not every organization or unit embraces evidence-informed changes easily and most need encouragement and support to adopt and sustain improvements. To help administrators and healthcare providers promote use of guidelines to make the best treatments available consistently across their organization, we did a two-phase study to learn about “naturally occurring diffusion” of guidelines—that is, how guidelines spread under normal, everyday conditions, not under researchers' control. Adopting what works best in natural spread is important while planning the introduction of new guidelines.

In Phase 1, we examined and mapped out in diagrams, how and where nursing guidelines developed by the RNAO spread internally and externally in the two years after they were introduced. In Phase 2, we looked at earlier guidelines—seven and 10 years after they were introduced—to see whether they were still in use. We wanted to know whether there were ongoing cost drivers and benefit levers (e.g., things that make benefits greater, faster or less costly to achieve). We were also interested in understanding the accuracy and completeness of the spread diagrams we created in Phase 1, and to learn about this we asked for feedback from senior administrators, managers and front-line staff.

Implications

Phase 1: A diagram of how one best practice guideline spreads both within and external to a specific organization may help that organization promote uptake of additional best practice guidelines. Spread diagrams capture the dynamic ways innovations expand through an organization over time, showing who was involved and what activities helped to get it adopted. Successful spread involves multiple layers of an organization, disciplines and sectors.

Phase 2: We found RNAO's best practice guidelines were sustained by early adopters 10 years after their initial uptake.

Getting innovations to spread through an organization and beyond—and getting them to spread faster—takes strong leaders at multiple levels, who share a common vision that's in line with achieving the goals all set together. Staff need to be afforded the time, space and opportunities to exchange ideas and learn together new knowledge and techniques. It is critically important to involve front-line staff in making best practice guidelines work in specific contexts and tackling long-standing barriers.

Best practice guidelines serve to improve patient and family experiences, clinical and health outcomes and health promotion by ensuring practices are based on the best available evidence.

Approach and results

Phase 1: We used data from an earlier two-year follow-up study of sustaining nursing best practice guidelines in 37 organizations across Ontario (Davies et al., 2006). We focused on six organizations (acute, long-term and community care), which had sustained the use of a guideline and spread its innovations to other units.

We used qualitative analysis to assess our interviews, site visits and documents, and developed stories and diagrams for each site to show the spread. Then we developed a scoring system for assigning value to the degree of spread (shown in Table 1, Appendix C). The system allotted increasing points for higher levels of spread—adoption by more than one unit to corporate-wide. There were also increasing points for involving other departments such as pharmacy or physiotherapy. Finally, activities that assisted spread were catalogued, including educating staff or peers and “committees of influence.”

We found networking and developing champions and external partnerships spread innovations, allowing more patients to receive evidence-informed care. There was significant variation among sites in how guidelines spread, and all but one had more internal than external spread (For detailed spread scores see Table 2 in Appendix C). The spread diagrams are in Appendix D). Data was analyzed to extract the most important aspects of spread – resources required; education, training and leadership needed and expected outcomes (Appendix E shows outcomes). Staff reported significant improvements in patient outcomes and many other positive results.

Phase 2: For Phase 2 we used an exploratory qualitative design, choosing the hospital and community organization with the highest spread scores in Phase 1. Chief nursing officers assisted by nominating senior administrators, managers and front-line staff for an on-site focus group with our research team.

Transcripts from the focus groups were downloaded into NVIVO 8 qualitative software. Definitions and cross-checking of codes was done. Coded transcripts were analyzed for themes and possible hypotheses about spread were tested against the data. Site visit observation reports written by each member of the research team were reviewed.

Participants told us their workplaces took deliberate steps to increase the speed and depth of adaptation of changes, such as creating opportunities for staff to communicate about change. They made use of well-developed social exchange processes, where individuals shared ideas and monitored developments in the organization. Such existing structures and processes leveraged success in implementation and outcomes.

The participants from these successful organizations said strategies and vision aligned—it was clear to front-line workers they needed to adopt the practices to make a safer environment for themselves and patients. Front-line workers were also deeply involved in making the guidelines work, by figuring out barriers and ways around them.

Participants from the community home care organization faced major barriers to implementing the guidelines because their funder in some cases refused money for the recommended care. Participants in the hospital group said there had been funding for implementing guidelines, but now they include implementation in their other responsibilities and try to continue spread through ongoing discussions and reviews.

When asked about the impact of evidence-informed care, an administrator said it was “absolutely better” to be a patient at the hospital now than ten years earlier. Areas of improved care at the hospital and the community healthcare agency included pain management, diabetes, cancer and wound care. As well, some preventative healthcare innovations have been tried, including region-wide programs to prevent falls in the elderly, strokes and screening women for abuse.

Further research

We dealt with internal and external spread separately, but it is worth investigating how they interact and spark ongoing diffusion and uptake as well as faster and wider spread. Can efforts on internal spread affect the type and number of spread strategies needed outside the organization? Does the speed of external spread depend on the speed of internal spread? How do they affect introduction of guidelines in the future?

Our findings would be more trustworthy if other healthcare providers at different levels in the original organization, such as physicians and dietitians, were asked about internal spread and providers at external sites were surveyed about external spread.

Study 4: Starting with Basics: Improving Communication to Improve Long-term Care

Context

Introducing best practice guidelines is essential for improving the quality of care for residents in long-term care homes. Effective change requires support from staff and management, and depends on teamwork and continuous, timely feedback for the people trying out new approaches. Creating a work environment conducive to changes in clinical practice can be challenging given the staffing realities of long-term care facilities, where the majority of workers are unregulated and the residents’ needs are complex.

Implications

Improvement projects are much more likely to succeed if staff and managers are involved in identifying problems and developing plans for dealing with them. That can be difficult in long-term care, where practice changes are often mandated by the province. Many workers in the facilities we studied told us poor communication and teamwork are serious problems for their organizations.

In this study, most organizations focused on changing their work environment rather than specific practices, but nevertheless showed significant improvements in two nursing-related outcomes: minimizing the use of restraints on residents and optimizing their daily activity. That despite the

fact the data showed the residents actually got frailer over the year of the study. This suggests better communication and teamwork and a supportive environment help with the introduction of best practices and bring a real impact on benefits to residents.

Introducing innovation in long-term care is a slow process that needs external support and feedback, such as is offered by long-term care coordinators from the Registered Nurses Association of Ontario. Staff and management at every level and in various departments must work together and combine efforts to improve residents' experiences in long-term care.

Different sources and forms of information and feedback can be helpful in motivating staff to begin and sustain change. In the short term, noting changes (such as posting thanks for improved communication) can be effective motivators. Longer term, patient data can be used to monitor the impact of practice changes on outcomes, and reassure participants their efforts are improving care.

Approach

Our goal was to provide insights about introducing innovations in long-term care by supporting interdisciplinary teams of front-line staff and managers as they began a change to improve clinical practice. This was a mixed-method randomized controlled trial, which examined practice changes in long-term care from the perspective of both staff and managers, and measured clinical outcomes with Ontario's Resident Assessment Instrument—Minimum Data Set (RAI MDS 2.0). We contacted a total of 131 regulated long-term care facilities in Evidence-Informed Ontario that use the assessment instrument; 23 agreed to participate in the study and were randomized into control or intervention groups.

To find out about the experiences, challenges and insights of using data to effect system change in the long-term care sector in Ontario, we taped semi-structured interviews at the beginning, midway through and at the end of the study in the intervention sites and at the beginning and the end at the control sites. We interviewed a mix of senior management; registered nurses and registered practical nurses, other health-team members and staff such as personal care workers or housekeepers at each site.

We compared clinical outcomes between intervention and control groups using RAIMDS data for three months before the intervention began and for its last three months (the most recent data available). We compared eight outcomes including falls, pressure ulcers, use of restraints, amount of patient activity, number of medications and weight loss. Statistical significance was tested using chi-square statistics. We also examined the control and intervention groups for differences in gender, average age, and need for help in daily activities.

Because this was a participatory study, the teams were asked to choose a change that was a priority for them and develop an action plan to address it. We offered one-day workshops (see Appendix F for workshop agenda) and ongoing support from the research coordinator and the RNAO regional best practice coordinator for a year at each site.

Results

Not all sites that agreed to participate did, and some were not ready to participate at different points in the study.

Table 2 – Data sources

Data sources	Intervention sites N = 12 sites 2 sites withdrew	Control sites N=11 sites 5 sites withdrew	Total N=23 sites 7 withdrew
Baseline interviews	10 sites 72 participants	11 sites 47 participants	21 sites 119 participants
Mid-point interviews	8 sites 44 participants	N/A	8 sites 46 participants
End-point interviews	10 sites 46 participants	6 sites 23 participants	16 sites 69 participants
RAI-MDS CIHI Data	10 sites**	6 sites**	16 sites**

** Incomplete data for some indicators from some sites

- ▼ Seven of 10 intervention sites said their priority was to improve communication and team relationships and at the end of the study, six of them said they had done so.
- ▼ The other sites focused on improving residents’ oral health, reducing falls, and developing a preceptor program for new staff; all changed practices because of the project.
- ▼ Six of 10 sites said an interdisciplinary approach including representatives from all departments helped to involve staff from across the facility, which led to greater support for the change project.
- ▼ Management support (by participating in the project, and seeking resources and support for it) was identified by nine out of 10 sites as important to their success.
- ▼ Seven sites used data, feedback and monitoring, including staff surveys, at the beginning and during the change process. Some groups reported progress in simple, colourful presentations, or displayed information to show improvements.
- ▼ Nine of 10 sites said the RNAO long-term care coordinator helped.
- ▼ Six of 10 sites said external resources, such as attending the RNAO Healthy Work Environment Summer Institute and using the RNAO website, helped.
- ▼ The majority of sites had problems initiating and sustaining the change process. The top challenge, identified by every site, was negative staff attitudes toward the project. Others included communication problems (eight of 10 sites), time and workload constraints (seven of 10 sites) and competing priorities (six of 10 sites).
- ▼ At baseline and follow-up, there were no statistically significant differences between residents in intervention and control groups with respect to gender, average age and level of dependence.
- ▼ The two clinical outcomes that are most responsive to changes in nursing practice—the extent to which daily physical restraints are used, and increasing patients’ activity level—showed statistically significant improvements (while at the same time, data showed residents became more dependent on help with activities of daily living).
- ▼ Control sites (not shown in the table) did not have statistically significant improvements in any indicators, and their residents also showed increased need for help with daily activities.

Table 3 – Clinical indicator data for eight intervention sites

Indicator	Fiscal quarter 2008 Q4 = baseline 2009 Q4 = follow-up	Indicator present N (%)	p-value (chi-square)
Pressure ulcers (overall)	2008 Q4	95(6.9)	0.131 (2.28)
	2009 Q4	118(8.4)	
Fallers	2008 Q4	149(10.8)	0.400 (0.71)
	2009 Q4	138(9.9)	
Daily physical restraints	2008 Q4	294(21.4)	0.006 (7.42)
	2009 Q4	242(17.3)	
Decline in range of motion	2008 Q4	134(9.9)	0.0001 (27.57)
	2009 Q4	229(16.7)	
Decline in late loss ADLs	2008 Q4	214(16.9)	0.248 (1.33)
	2009 Q4	238(18.7)	
Little or no activity	2008 Q4	437(31.8)	0.003 (8.79)
	2009 Q4	373(26.6)	
Weight loss	2008 Q4	94(6.8)	0.725 (0.12)
	2009 Q4	91(6.5)	
	2009 Q4	6(1.3)	
Nine or more medications	2008 Q4	802(58.3)	0.077 (3.12)
	2009 Q4	862(61.6)	

Note: some indicators missing for some sites

Further research

We would like to see a study that compares implementing clinical best practice guidelines in long-term care with and without support for team functioning and communication. We also need longitudinal studies to examine the full impact of improvements in team functioning and communication on resident outcomes.

We are also wondering whether the recent introduction of new laws governing long-term care in Ontario will affect adoption of evidence-informed practices.

Study 5: A New Approach for Analyzing the Costs and Benefits of Spreading Nursing Innovations System-wide

Context

How innovations spread is the subject of much research. We know characteristics of innovations determine the rate at which they spread, and many authors have examined strategies for enhancing and supporting the uptake of innovations. But much of that research is focused on individual innovations within organizations. We wanted to identify what drives costs at the system level so the total cost of scaling-up an innovation across the healthcare system can be calculated.

We also wanted to identify the “benefit levers” that support and enhance uptake, spread and sustainability of evidence-based practices. Benefit levers are factors that enhance the benefits of innovations, or make them quicker or less costly to achieve. Healthcare policy and legislation that support proposed changes, or trained champions who guide the change process, are benefit levers if they make it easier to achieve the desired objectives and outcomes.

Implications

You cannot develop a thorough understanding of the costs and benefits of the spread of an innovation without understanding the cost drivers and benefit levers that come into play when it is scaled up. They vary because of organizational context and differences such as whether the setting is urban or rural, primary, acute or long-term care. Scaling up evidence-informed innovations has non-linear effects on cost drivers and ultimate costs, as well as on benefit drivers and ultimate benefits. Thus, mixed models of fixed and variable costs, economies (or diseconomies) of scale, and an expanded cost and benefit hierarchy to capture these effects is essential.

Approach

Our work was based on empirical data from each of the first four studies in our program of research. The team leader for this study met regularly with each of the project leads to identify indicators or proxies for data collection from their studies that would capture cost drivers and benefit levers. We concentrated on identifying activities involved in the spread of innovations within and across organizations, and the structural cost drivers and benefit levers underlying these.

As each study was completed, we listed the system-level structural cost drivers and benefit levers that emerged. Then we asked the leads to identify empirical data from their study that supported or refuted items on the list, and adjusted these accordingly. Using a wholesystems approach, we also assembled an emerging set of costing principles and assumptions for inter-organizational spread of innovations.

Next, was to review three previous costing studies, completed by team members (Edwards, Downey, Griffin et al., 2005), which assessed the costs and benefits of implementing RNAO’s best practice guidelines for pressure ulcers, vascular access devices, and client-centred care across Ontario. We compared the assumptions that we made for estimating the cost of province-wide spread with the systems approach adopted for this study.

Finally, we looked at systematic reviews and costing articles on the spread and scale-up of innovations, to compare their costing principles and assumptions on system spread to those we developed, to refine our final list. For example, “cost hierarchy” has traditionally referred to cost at unit, batch, product-sustaining and facility levels. But we realized that a whole-systems approach to costing meant we had to consider costs at a fifth, systems level. A discussion of benefit levers was absent from these reviews and articles.

At that point, we could describe a systems model showing how cost drivers and benefit levers can be conceptualized and operationalized, as well as how they relate to one another as innovations to improve nursing care are introduced.

Results

We identified four benefit levers—factors that encourage an innovation to flow across systems.

These are:

- 1) **Alignment**—There has to be a general agreement among stakeholders involved in the innovation of why and how the change should occur, whether the change is driven by ideological or philosophical reasons, regulations, policies, funding models and/or quality improvement targets.
- 2) **Planned spread**—Innovations flow when there are intentional, organized efforts to spread change across sectors and through all levels of the system.
- 3) **Strong leaders for change**—Innovation is led by people who champion change and provide a clear vision and direction for a change in the way things are done and transparency about underlying problems.
- 4) **Supporting and reinforcing structures**—System-wide benefits from regulatory frameworks, policies and infrastructure that make it easier to implement, monitor compliance, evaluate outcomes and sustain the change in practice. Linking all levels of an organizations, and spreading evidence-based innovations such as RNAO’s best practice guidelines, help set norms, optimizing care and outcomes.

We identified four structural cost drivers:

- 1) **Scale**—The scale of organization and system investments.
- 2) **Scope**—The degree of integration within and across the system and organization.
- 3) **Experience**—The number of times a process has been done in the past by individuals and organizations.
- 4) **Complexity**—The degree of complexity of services offered.

We also identified several ways in which benefit levers, cost drivers and costs are related.

These are:

- ▶ System alignments, whether they are internal or external to the change process may produce economies of scale as an innovation is scaled-up.
- ▶ System-level structures that support and reinforce scale-up of innovations may reduce the costs of scale-up at the organizational level, while enhancing benefits in both the short and longer term.
- ▶ When successful innovation changes organizational culture and aligns with and supports future evidence-informed innovations, it should lower their cost.

All these factors can enhance the benefits of spreading innovation and reduce the cost of spread. Feedback on change influences the dynamics of spread, including which benefit levers come into play and what drives costs.

Further research

The model we have developed needs to be tested on a wider range of nursing and other healthcare innovations, and the usefulness of our costing principles and assumptions for system spread requires closer examination by health economists. We would also like to see research and health economic analyses contrasting the costing principles and assumptions arising from our model with traditional approaches.

PROGRAM OF RESEARCH FINDINGS

Context

Prior research on evidence-informed practice has been focused on changes at the practitioner or organization level, with the largest body of research on medical practice. It requires a systems lens to understand how promising changes can be implemented and supported throughout the healthcare system. We focused on the clinical practice of nurses because they have a 24/7 presence with patients, and comprise the largest proportion of professional healthcare workers in Canada. As previously demonstrated by our work (Davies, Edwards, Ploeg & Virani, 2008; Edwards, Davies, Ploeg, Virani & Skelly, 2007) and that of others (Buchanan, Fitzgerald & Ketley, 2007; Davies, Tremblay & Edwards, 2010; Greenhalgh et al., 2005; Massoud et al., 2006), supporting nurses and organizations as they implement clinical practice guidelines can improve patient outcomes and sustain those changes (Davies, Edwards, Ploeg et al., 2006). Yet, there is much to learn about how to spread evidence-based practices across sectors, regions and throughout the healthcare system as a whole. Thus we aimed our program of research at understanding what conditions and factors support the diffusion and sustained implementation of evidence-informed practices and models of nursing services across the healthcare system.

Implications

Implementing nursing best practices involves complex networks of individuals and organizations coming together to make transformative change. System change mechanisms must be put in place alongside organizational change processes to support the spread of evidence-informed models of nursing service. Champions at every level of an organization and the health system as a whole can help form these networks and accelerate the speed of spread.

Strong leadership for change, finding ways to align innovations with opportunities, making deliberate plans to spread evidence-based practices and creating or using structures that support and reinforce their introduction and spread, are all means to improve the benefits achieved from introducing these innovations.

Contextual influences, including social, political and economic realities, must be taken into account as evidence-based nursing practices are spread. Adapting these to sectors, communities, and organizational contexts is paramount for their successful spread and impact.

Approach

Decision-makers were involved in all aspects of this research program, as co-leads and members of each project team, as co-authors on our whole systems literature review, as participants in our “systems commons” (a virtual forum we created for decision-makers, managers and researchers to discuss innovations in healthcare systems) and our invitational symposia, and as members of

our national advisory committee. One of our overall aims was to develop a conceptual model that integrated our findings and we met with all the project teams to develop and refine the model as our work progressed. We also shared the model during an invitational symposium (August, 2010), inviting input and critique and asking participants whether the model's elements resonated with their experience. During the symposium, we learned about other models of systems change being introduced including the Blueprint for Health in Vermont, USA; and reforms in Adelaide, Australia and the National Health System in the UK. These experiences provided important points of reflection for the model that emerged from our findings.

We have worked on dissemination throughout the program, aiming at various audiences. Input from our national advisory committee contributed to shaping the systems commons sessions (see Appendix G for summaries) that we held via the CHNET-works! virtual platform. During these sessions, leading decision-makers were invited to make presentations pertinent to our work, which were followed by discussions involving members of our research team and leaders from across the country. Our two invitational symposia provided an opportunity to discuss research findings with key decision-makers. We also used dissemination vehicles such as the Nursing Best Practice Research Unit newsletter and website, and RNAO's workshops and conferences to profile project results.

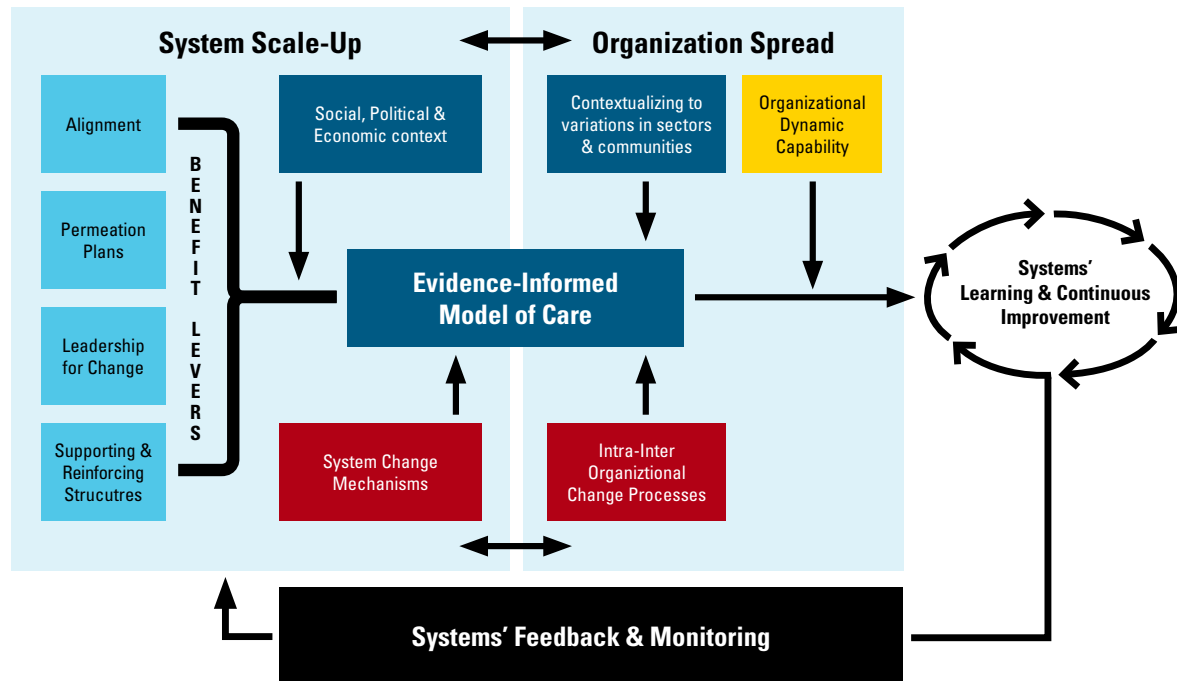
We plan to continue sharing of our research in several ways. We have written brief "communiqués" on each of our projects for managers and decision-makers (samples are included in Appendix H) and we have begun to publish our work. We will present project findings at upcoming national and international conferences, make presentations to key decision-maker groups, prepare briefing notes on the overall program of research, write more communiqués, and publish in major journals.

Results

The model (see Figure 1) was developed based on findings from all our studies. It shows the dual processes of spread that take place within organizations and at the system level. Innovations introduced within organizations may provide the stimulus for systems change, or top-down systems change may drive organizational change.

We found both scale-up of change at the systems levels and spread of change at the organizational level contributed to the development of evidence-informed models of care, showing it is a whole systems change process. Spread involves more than clinical practices. Supporting a shift in the way services are provided can involve policies and procedures, implementation strategies, governance and decision-making structures, and monitoring and funding mechanisms.

Figure 1: Spread and scale-up of evidence-informed models of care: A whole systems's perspective



We found evidence-informed models developed in several ways. In some cases the innovation was inserted into existing practice, to augment what was already being done. In other cases, the innovation was a substitution, so the new practices were introduced while the old ways were being actively dismantled, as in the case of introducing minimal/least restraint policies. Some of the models we examined were shaped by innovations, but also involved more subtle philosophical or ideological shifts in practice for the innovation to be introduced (such as accepting a harm-reduction approach before introducing needle-exchange programs). Finally, models arose from the introduction of an innovation where a more substantial shift in the structures required for service delivery was needed to let the innovation happen. Nurse practitioner-led clinics were a prominent example of this type of model in our literature review, and a clinic-based model for treating venous leg ulcers was an example from the RNAO best practice guidelines.

At the systems level, four major factors leverage benefits (the desired changes defined from either a strategic or operational point of view) as evidence-informed changes are introduced. These benefit levers are: alignment, leadership that values system change, plans for spread, and supporting and reinforcing structures. Benefit levers support or enhance the process of implementing best practice guidelines and the models of care required for their delivery, in order to produce desired change. Benefit levers sometimes reinforced each other.

Introducing change across the system required special mechanisms, including intentionally pushing the boundaries of complex structures and delivery systems, increasing shared ownership of both the health issue and the evidence-informed practices between organizations and between sectors, and planning resource use for the new models of care. Connections across system levels were made by change agents, including champions, managers and leaders. These change agents played an important role in contextualizing the innovation, sometimes working beyond their usual sphere of influence.

Strategies that helped with the spread of change within and across organizations included creating platforms for communication and social exchange, educational processes for training and knowledge transfer, and communication processes and opportunities for inter-organizational learning. Some champions and managers capitalized on existing monitoring and feedback systems or developed new ones to support learning as innovations were introduced. It was important for leaders to align their organizational policies and processes so the change being implemented could work, which in turn helped shift the organizational culture to make it more supportive. Change, within organizations and at the system level, was dynamic and non-linear.

Managers, staff and champions had to adapt their implementation strategies to accommodate constantly evolving systems. However, their ability to adapt was influenced by how dynamic their organization was, and whether the work environment was flexible enough to allow for and support change. Managers needed support from more senior decision-makers to engage in this change process. There was evidence that people introducing evidence-informed practices adjusted their implementation strategies depending on their sector, different human resource realities and different patient populations. In long-term care, the large number of unregulated workers and the power of the regulatory system affected how change could be introduced. In home care, the interface between Community Care Action Centres and service delivery organizations influenced the spread of innovation.

Finally, giving feedback—immediate and longer-term—generated learning that shaped how innovations were introduced at both system and organizational levels. It was key to get feedback and evaluations to decision-makers promptly.

Further research

We think that the empirical model we have developed applies to all health professionals introducing healthcare systems change. It would be useful to test our model in other fields and in other settings.

We observed implementation strategies being used by leaders under naturally occurring conditions. Systematically testing them and furthering our understanding of how they work in tandem with change processes in organizations that deliver health services is another area of promising inquiry.

In Ontario, implementation of nursing best practice guidelines has been led by a provincial association with support from the Government of Ontario and with the involvement of nurses and other decision-makers across the system. RNAO's best practice guidelines are now spreading across Canada and internationally and it will be important to examine whether the spread processes we observed in this study are similar to those in other political and economic contexts.

Because systems change is slow, it is important to examine the long-term impact of evidence-informed nursing practice models on clinical practice, patient or client outcomes, policy directions and costs.

Further work is required on economic models that examine the costs, savings and benefits from scaling-up best practices in nursing using costing principles that are consistent with innovation scale-up.

Finally, as suggested in previous work (Grinspun, 2007), we need to better understand how organizational structures that enable sharing of power, decision-making and knowledge among governance, senior management and point of care levels might support nurses' adoption and spread of evidence-based practices.

ADDITIONAL RESOURCES

Web links

Link to NHS sustainability mode:

http://www.institute.nhs.uk/sustainability_model/general/welcome_to_sustainability.html

Link to RNAO BPG website:

<http://www.rnao.org/Page.asp?PageID=861&SiteNodeID=133>

Link to NBPRU site:

<http://www.nbpru.ca/>

Link to SURE project on CHSRF website

http://www.chsrf.ca/Migrated/PDF/ResearchReports/OGC/davies_e.pdf

Presentations

Ploeg, J., Skelly, J., Rowan, M., Edwards, N., Davies, B., Grinspun, D., Bajnok, I., Downey, A. A mixed methods study of the role of nursing best practice champions. Paper presentation accepted 7th Biennial Joanna Briggs International Colloquium, Chicago, Illinois, September 13-15, 2010.

Ploeg, J., Skelly, J., Davies, B., Edwards, N., Bajnok, I., Grinspun, D., Downey, A., Rowan, M. The impact of champions on spread of best practice guidelines. Accepted for presentation at the 5th Biennial International Conference on Evidence-Based Clinical and Management Decision Making, October 2010, Toronto.

REFERENCES

Argote, L. (1999). *Organizational Learning: Creating, Retaining and Transferring Knowledge*. Norwell, MA: Kluwer Academic Publishers.

Bodenheimer T. (2007). *The Science of spread: How innovations in care become the norm*. Oakland, California: California HealthCare Foundation.

<http://www.chcf.org/topics/chronicdisease/index.cfm?itemID=133461>

Bowman, C.C., Sobo, E.J., Asch, S.M. & Gifford, A.L. (2008). Measuring persistence of implementation: QUERI series. *Implementation Science*, 3 (1), 21.

Buchanan D.A., Fitzgerald L. & Ketley D. (2007). *The sustainability and spread of organizational change: Modernizing healthcare*. New York: Routledge.

Davies, B. & Edwards, N. (2009) The action cycle: Sustain knowledge use. In: *Knowledge to Translation in Health Care: Moving from Evidence to Practice* (eds S. Strauss, J. Tetroe & I. Graham), pp. 165-173. Wiley-Blackwell and BMJ, Oxford.

Davies, B., Edwards, N., Ploeg, J., Virani, T. (2008). Insights about the process and impact of implementing nursing guidelines on delivery of care in hospitals and community settings. *BMC Health Services Research*. 8(29), 1-15.

Davies B, Edwards N, Ploeg J, Virani T, Skelly J & Dobbins M. Determinants of the sustained use of research evidence in nursing: Final Report. Canadian Health Services Research Foundation & Canadian Institutes for Health Research. Ottawa, Ontario, Canada, December 2006.
http://www.chsrf.ca/final_research/ogc/pdf/davies_final_e.pdf

Davies, B., Tremblay, D., Edwards, N. (2010). Sustaining evidence-based practice systems and measuring the impacts. In D. Bick & I. D. Graham (Eds.), *Evaluating the Impact of Evidence Based Practice*. Oxford: STTI/Wiley-Blackwell, pages 165-188.

Denis J.L., Hebert Y., Langley A., Lozeau D., & Trottier, L.H. (2002). Explaining diffusion patterns for complex health care innovations. *Health Care Management Review*, 27, 60-73.

Edwards, N., Davies, B., Ploeg, J., Virani, T., Skelly, J. (2007). Implementing nursing best practice guidelines: Impact on referrals. *BMC Nursing*. 6(4): 1-9

Edwards, N., Downey, A., Griffin, P., Lang, A., Eldred, S., Danseco, E., Perrier, A. (2005). Costing Models for the Implementation of RNAO Best Practice Guidelines. Cycle 4 Technical Report. RNAO Best Practice Guidelines Project. P. 1-92.

Edwards, N., Marck, P., Virani, T., Davies, B., & Rowan, M. (2007). *Whole system change in health care: Implications for evidence-informed nursing service delivery models*. Ottawa, Ontario: University of Ottawa.

Estabrooks, C.A., Midodzi, W.K., Cummings, G., & Wallin, L. (2007). Predicting Research Use in Nursing Organizations. *Nursing Research*, 56(4S), S7-S23.

Greenhalgh T., Robert G., Bate P., MacFarlane F. & Kyriakidou O. (2005). *Diffusion of Innovations in health service organizations: A systematic literature review*. Malden, MA: Blackwell.

Grinspun, D., Virani, T., & Bajnok, I., (2002). Nursing Best Practice Guidelines: The RNAO Project. *Hospital Quarterly*. Winter, 54-58.

Grinspun, D. (2006). *Using Evidence, politics, communication and media to shape health Public policy*. Toronto, Ontario: Registered Nurses' Association of Ontario. Retrieved from:
<http://www.rnao.org/Page.asp?PageID=122&ContentID=1660&SiteNodeID=385>

Grinspun, D., (2007). Healthy Workplaces: The Case for Shared Clinical Decision Making and Increased Full-Time Employment. *Healthcare Papers Vol. 7* (69-75).

Grinspun, D., Melnyk, B.M., & Fineout-Overholt E. (2010). Advancing Optimal Care with Clinical Practice Guidelines (pp. 186-204). In B.M. Melynk & E. Fineout-Overholt (Eds). *Evidence-Based Practice in Nursing & Healthcare. A Guide to Best Practice 2nd ed.* Philadelphia: Lippincott, Williams & Wilkins – Second Edition.

Harvey, G., Loftus-Hills, A., Rycroft-Malone, J., Titchen, A., Kitson, A., McCormack, B., Seers, K. (2002). Getting evidence into practice: the role and function of facilitation. *Journal of Advanced Nursing*, 37(6), 577-588.

Massoud, M.R., Neilson, G.A., Nolan, K., Nolan, T., Schall, M.W., & Sevin C. (2006). A framework for spread: from local improvements to system-wide change. IHI Innovation Series White paper, Cambridge, MA: Institute for Healthcare Improvement (available at www.IHI.org).

Meyer, A.D., & Goes, J.B. (1988). Organizational Assimilation of Innovations: A Multilevel Contextual Analysis. *Academy of Management Journal*, 31(4), 897-923.

Ploeg, J., Skelly, J., Rowan, M., Edwards, N., Davies, B., Grinspun, D., Bajnok, I., Downey, A. The role of nursing best practice champions in diffusing practice guidelines: A mixed methods study. *Worldviews on Evidence Based Nursing*.

Rich, R., & Oh, C.H. (2000). Rationality and use of information in policy decisions: a search for alternatives. *Science Communication*, 22(3), 173-211.

Rogers E.M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Shank, J. K. (1989). "Strategic Cost Management: New Wine, or Just New Bottles?" *Journal of Management Accounting Research*, Vol.1, 47-65.

Zahra, S.A., & George, G. (2002). Absorptive Capacity: A Review, Reconceptualization, and Extension. *Academy of Management Review*, 27, 185-203.

Zaltman, G., Duncan, R., & Holbeck, J. (1973). *Innovations and Organizations*. New York: Wiley.