

Nursing Implementation Science: How Evidence-Based Nursing Requires Evidence-Based Implementation

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***Purpose:** Evidence is not always used in practice, and many examples of problematic implementation of research into practice exist. The aim of this paper is to provide an introduction and overview of current developments in implementation science and to apply these to nursing.*

***Methods:** We discuss a framework for implementation, describe common implementation determinants, and provide a rationale for choosing implementation strategies using the available evidence from nursing research and general health services research.*

***Findings:** Common determinants for implementation relate to knowledge, cognitions, attitudes, routines, social influence, organization, and resources. Determinants are often specific for innovation, context, and target groups. Strategies focused on individual professionals and voluntary approaches currently dominate implementation research. Strategies such as reminders, decision support, use of information and communication technology (ICT), rewards, and combined strategies are often effective in encouraging implementation of evidence and innovations. Linking determinants to theory-based strategies, however, can facilitate optimal implementation plans.*

***Conclusions:** An analytical, deliberate process of clarifying implementation determinants and choosing strategies is needed to improve situations where suboptimal care exists. Use of theory and evidence from implementation science can facilitate evidence-based implementation. More research, especially in the area of nursing, is needed. This research should be focused on the effectiveness of innovative strategies directed to patients, individual professionals, teams, healthcare organizations, and finances.*

***Clinical Relevance:** Implementation of evidence-based interventions is crucial to professional nursing and the quality and safety of patient care.*

[Key words: diffusion of innovation, professional practice, healthcare reform, nursing]

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Optimal use of research evidence in nursing is often referred to as evidence-based practice. Following Sackett's definition of evidence-based medicine (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996), evidence-based practice can be defined as "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care for individual patients" (p.71). This definition indicates the importance of using evidence, while "judicious use" shows the importance of other factors such as patient preferences and context in the care for individual patients.

Davis and Taylor-Vaisey (1997) define implementation as the introduction of an innovation in daily routines, demanding effective communication, and removing hindrances. Implementation is different than related terms such as diffusion (used for a natural process of knowl-

edge spreading), dissemination (used for planned and active knowledge spreading) and adoption (referring to decisions on innovations, rather than use in routines).

Regretfully, numerous examples from daily nursing practice show how the implementation of evidence in practice is often not accomplished. Studies on hand-hygiene

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practices, for instance, consistently indicate that hospital workers are compliant to hand-hygiene prescriptions in less than 50% of all relevant occasions (Pittet et al., 2000). Although nurses tend to be somewhat more compliant than are physicians, the overall low compliance rates are a serious threat to patient safety and are truly puzzling considering the well-established evidence in this area.

Similar difficulties are found in other areas in terms of changing nurses' behavior in order to implement evidence. For example, difficulties in using effective measures for pressure-ulcer prevention (De Laet, Schoonhoven, Pickkers, Verbeek, & van Achterberg, 2006) are reported and Segaar and colleagues (2007) have demonstrated that implementing effective, nurse-delivered smoking-cessation interventions in cardiology wards was also difficult.

While these examples show how implementing effective practices can be problematic, "de-implementation" can be just as difficult. A recent study by Huizing, Hamers, Gulpers, and Berger (2006) showed that a program directed at discouraging ineffective use of restraints for preventing falls in nursing home residents was largely unsuccessful. A study by Vermeulen, Meents, and Ubbink (2007) indicated that before surgery, patients are denied nutrition for approximately four times the duration proposed in current guidelines. These examples show how a gap between current knowledge and practice often exists. This gap is not merely frustrating to academics who hope to see their research results used but directly threatening to nurses' professionalism and the safety and quality of patient care.

Given implementation difficulties, the aim of this paper is to provide an overview of current developments in implementation science and to apply these developments to nursing. We will describe a general framework for implementation projects, discuss common determinants of successful and unsuccessful implementation, and describe current evidence for implementation strategies. Finally we will discuss strategies to facilitate successful implementation in nursing practice.

A Framework for Implementation

The international literature indicates several models that refer to implementation. Many were developed concerning nursing. Titler et al. (2001) proposed the Iowa Model of Evidence-Based Practice to Promote Quality Care. The Iowa model has a series of steps and decision points, taking nurses from problem or knowledge-focused triggers to accomplishing an actual change in practice. Implementation is one of the many steps in this model. Here, the authors propose the use of Rogers' theory for diffusion of innovation (Rogers, 1983, 2003) and that implementation leaders should consider (a) characteristics of a new guideline, (b) users of the guideline, (c) methods of communicating the guideline, and (d) the social system in which a guideline is to be adopted (Titler & Everett, 2001).

The Stetler model is for applying research findings into practice (Stetler, 1994) and is a revision of the earlier

Stetler/Marram model (Stetler & Marram, 1976). Stetler proposes six phases from considering the use of studies to a final evaluation of actual use in practice. Implementation occurs after several steps of critical appraisal and decision making and is addressed in the fifth phase: translation/application. The discussion of this phase however, goes into translating findings into practical implications rather than considerations for choosing implementation strategies.

In recent publications, Stetler refers to the Pettigrew and Whipp model for content, context, and process of strategic change (Pettigrew & Whipp, 1992; Stetler, Richie, Rycroft-Malone, Schultz, & Charns, 2007), thus emphasizing the importance of the what, why, and how of strategic change. Furthermore, she refers to the framework for strategic implementation developed by the Quality Enhancement Research Initiative (Stetler, McQueen, Demakis, & Mittman, 2008). The latter framework approaches implementation by addressing (a) cultural norms and values, (b) capacity, and (c) supportive infrastructures to reinforce expectations for change and to sustain new behaviors.

Kitson and colleagues developed the promoting action in research implementation in health services (PARIHS) model (Kitson, Harvey, & McCormack, 1998; Rycroft-Malone et al., 2004). Essentially, this model indicates the importance of building bridges between the innovation (evidence and nature of evidence in the model) and the context where implementation should take place.

Finally, the above mentioned model of evidence-informed nursing (McSherry, Simmons, & Abbott, 2002) has implementation as a fourth step, following information gathering and appraisal and preceding the evaluation of change in practice. The authors discuss common barriers for implementation and suggest the use of a basic unfreezing-moving-freezing change model after accomplishing an accurate diagnosis of the situation where change should take place. Whereas the Stetler model does not include implementation issues, the Iowa, PARIHS, and evidence-informed nursing models indicate many considerations relevant for implementation projects.

From a more general focus on facilitating change in healthcare practice, Grol and Wensing (2005) developed their model for effective implementation. More than with other models, their stepwise approach takes the user through a series of rational and deliberate steps in order to accomplish practice improvement (**Figure 1**).

The model for effective implementation starts with the identification of relevant practice issues (problems or best practices) and matching research findings or guidelines. This match is a first and essential element in accomplishing change, because without it implementation might not be justified and members of the target group will likely show strong resistance to change. Then, the model is a methodic process starting with the description of operational-change objectives and a thorough analysis of current practice, the target group, and the context where change should take place. The crucial step in the model, the development or

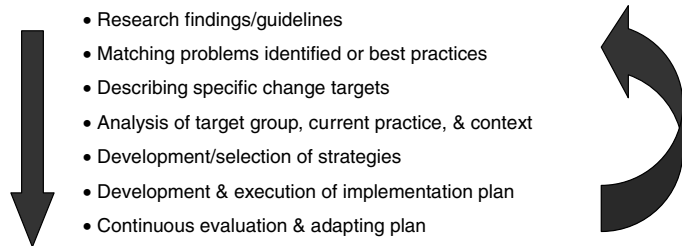


Figure 1. Simplified presentation of the model for effective implementation.

selection of strategies, is facilitated by the previous steps. In this way, the model prevents the selection of standard but inappropriate solutions and facilitates better choices. Finally steps include operationalizing an implementation plan (who does what, when) and the evaluation of both process and outcomes.

The analytical approach to deliver clear rationale for implementation is an essential feature of the Grol and Wensing model allowing it to be applied in a variety of settings. Therefore, we will use the model as a frame of reference for our discussion of relevant issues in implementation science for nursing. We will focus on the analysis of factors relevant to implementation (target group, current practice, and context; Step 3 of the model) in nursing and choosing relevant implementation strategies (Step 4).

Analysis

Target Group

Nurses are not a uniform target group but are professionals with various educational levels, specializations, patient populations to be served, and work settings. All these variations are potentially relevant to implementation. Rogers (1983) presented five categories of innovativeness, where 2.5% and 13.5% of most groups would probably be innovators and early adopters respectively. The numbers of innovators, early adopters, laggards, and so on will vary for different target groups within nursing.

Investigators have reported nurses' basic research training, job descriptions, time spent studying (both at work and off hours), nurses' time on the Internet, staff attitudes and beliefs, and levels of emotional exhaustion as factors that can stimulate or hinder the implementation of evidence and innovations in nursing (Meijers et al., 2007; Estabrooks, Midodzi, Cummings, & Wallin, 2007; Ploeg, Davies, Edwards, Gifford, & Miller, 2007). Other target-group factors commonly found in healthcare settings and likely to apply to nurses as well, are knowledge, skills, motivation, and social influence amongst colleagues (Grol & Wensing, 2005). These reports show the relevance of target-group characteristics and the need to consider these in analyses preceding implementation.

Current and Proposed Practices

The analysis of current versus proposed practice should ideally confirm the match between practice needs and proposed innovations. Grol and Wensing (2005) report that discussions about the actual level of evidence supporting proposed practices hinder implementation and doubts about the need for innovations are a crucial barrier in implementation projects. Complexity, time needed, costs, and risks related to the innovations are other potentially hindering factors concerning implementation. These common barriers apply to nursing contexts. Dobbins et al. (2007), for instance, found nursing managers often doubted the relevance and value of research findings. Common facilitators of change include fit with current practice and possibilities for adjusting the innovation to the user's needs and insights.

Context

Numerous contextual factors influence successful implementation of evidence into practice. Factors identified in studies of implementation of evidence in nursing include nursing culture and leadership, hospital size, staffing support, organizational innovativeness, administration responsiveness, access to resources, organizational climate, provision of education, access to research findings, availability of knowledge and skills within organizations, integration of recommendations into organizational structures and processes, inter-organizational collaboration, money, workload, resistance to change, and time (Davies et al., 2008; Dobbins, Rosenbaum, Plews, Law, & Fysh, 2007; Estabrooks et al., 2007; Meijers et al., 2007; Ploeg et al., 2007). Research regarding how nursing context influences knowledge implementation is relatively new, so this list of factors might be preliminary. However, this brief overview is similar to contextual factors identified for accomplishing change in healthcare in general (Grol & Wensing, 2005).

Performing the Analysis—The Case of Hand Hygiene

Alternative methods could be used for the analysis of determinants of implementation success, but modest qualitative approaches are often worthwhile when exploring new situations. Examples of these qualitative approaches are observations (e.g., Diwan, Sachs, & Wahlstrom, 1997, who studied determinants of primary care practice innovation by observing medical and nursing care), focus groups (e.g., Dijkstra, Braspenning, & Grol, 2002, who studied factors relevant to the implementation of a diabetes-care guideline by conducting focus groups with patients and diabetes-care teams) or interviews (e.g., Van Eijken, Melis, Wensing, Olde Rikkert, & van Achterberg, 2008, who conducted interviews with nurses and physicians to evaluate the feasibility of a new community-based geriatric intervention program). When needed and relevant, a structured and somewhat large-scale approach (e.g., structured questionnaires) could follow the initial exploration then quantification could be used to assess the relative importance of factors.

Table 1. Reasons for Noncompliance With Hand-Hygiene Prescriptions

Cognitions	Seldom see complications	61%
	Lack of hard evidence for some of the prescriptions	43%
Attitude & motivation	Irritation of the hands	81%
	Takes too much time	50%
Routines	Forgetting	65%
Social	Nobody controls	50%
	Management not interested	45%
Organizational	Not feasible in work	61%
	No hospital guideline	49%
Resources	Lack of facilities	42%

Adapted from Grol & Grimshaw, 2003.

An example where quantification was used is presented by Grol and Grimshaw (2003; see Table 1). Reasons for noncompliance with hand-hygiene prescriptions were studied in hospital-based physicians and nurses. Negative attitudes resulting from irritation of the hands were important in many workers, followed by forgetting, the perception of few complications (probably because of impossibility of relating infections to a single person or a single hand-hygiene violation) and limited feasibility of following all prescriptions every day. The analysis with this example shows that multiple factors can cause noncompliance, and indicates the need for selecting multiple strategies for improving compliance.

Selecting or Developing Strategies for Implementation

Following the analysis, we face the crucial step of selecting or developing strategies for implementation. While enthusiasm might tempt us to develop challenging and fun

programs for implementation, we should not omit a deliberate choice of strategies matching barriers and facilitators.

Van Woerkom (1990; see Figure 2) classifies strategies as either involuntary (laws, regulations) or voluntary. Within the group of strategies classified as voluntary, strategies were focused on intrinsic motivation and strategies focused on extrinsic motivation can be distinguished. Whereas intrinsic motivation strategies are focused on individuals, extrinsic motivation strategies are focused on social influence or the use of penalties and rewards.

Implementation project leaders tend to prefer voluntary, intrinsic motivation-focused strategies. Holleman et al. (2006) and van Achterberg (2006), attempting to make an inventory of strategies used in the promotion of evidence-based practice by professional nursing organizations, found that involuntary strategies were not at all used or proposed. Furthermore, 132 of the 179 strategies identified were focused on intrinsic motivation, 103 of these strategies were directed at competence or attitude. This review shows how traditional training still dominates many implementation projects, leaving other strategies relatively underused.

Evidence for Implementation Strategies

In 2002 the Registered Nurses Association of Ontario (RNAO) published an “implementation toolkit” indicating the use of local consensus strategies, interactive education, outreach visits, reminders, and opinion leaders as main strategies for implementation (RNAO, 2002). However, RNAO leaders warn that their recommendations are largely based on studies performed in non-nursing contexts.

Halfens and Van Linge (2003) performed a systematic review of the evidence for implementation strategies in nursing contexts. They identified 39 studies, with 17 studies focused on the use of combined strategies and 13 studies in which investigators evaluated the use of education. Both education and multiple strategies were mostly

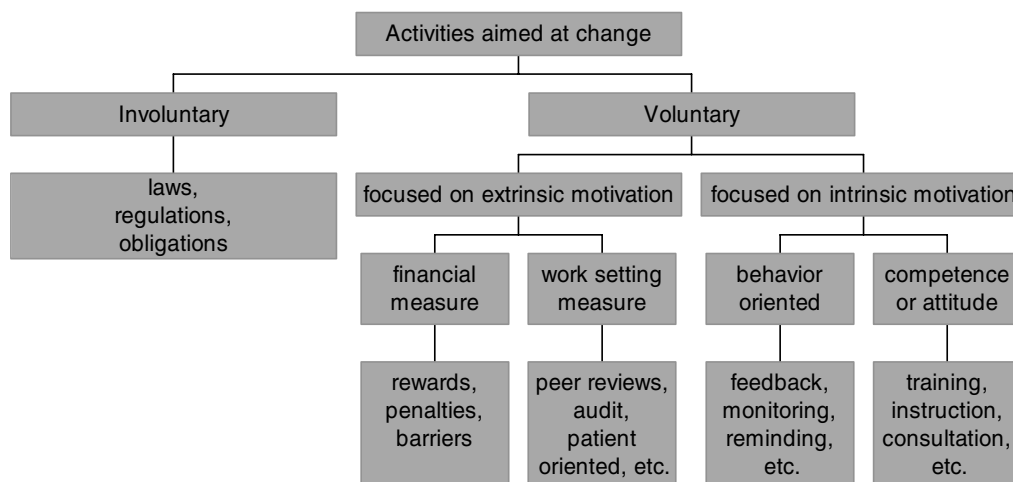


Figure 2. Range of potential implementation strategies.

effective. Results for other strategies (such as reminders or opinion leaders) were inconclusive.

While the evidence for the use of implementation strategies in nursing is still rather scarce, evidence is available from studies in medicine, especially in family medicine. Although generalizing this evidence to nursing might be questionable, it could inspire future nursing projects. Reviews by Grol and Grimshaw (2003) and Grimshaw and Eccles (2004) provide overviews of evidence regarding implementation strategies. Contrary to results of Halfens and Van Linge (2003) who identified education as a successful implementation strategy in nursing, Grol and Grimshaw (2003) found that education alone resulted in mixed effects when used in health-care workers at large. Mixed effects were also found for several commonly used strategies (such as feedback on performance), whereas supportive strategies such as reminders, decision support, use of ICT, and rewards were mostly effective. Furthermore, combined strategies were identified as more effective than were single strategies.

Grimshaw and colleagues (2004) tried to calculate effect sizes for commonly used strategies from a total of 235 studies and found an average 10% increase in desired behavior in studies reporting statistically significant positive effects. The effect size varied with strategies of choice and was 14% for use of reminders, whereas effect sizes of 6% to 8% were found for audit and feedback or educational strategies. Contrary to the Grol and Grimshaw (2003) review, this review did not clearly find superior effects for combined strategies. Furthermore, this review reported a lack of “transparency” and rationale regarding the selection of strategies, leaving room for doubts about their appropriateness in the projects included in the review. The lack of transparency and rationale regarding strategy selection probably applies to most studies in this area.

Selecting Strategies by Linking Determinants and Theory Proposed Strategies

While considering the range of potentially relevant strategies for implementation and the evidence regarding which strategies are successful in changing behavior, an important pitfall is that these overviews do not automatically lead to a good match between determinants of successful implementation and strategies to promote implementation. Indeed, “mostly effective strategies” could be ill chosen when they do not link with relevant implementation determinants. Also, mixed effects found in the reviews on the effectiveness of strategies could be because of unlucky combinations of determinants and strategies. If, for instance, skin irritation were to be identified as the most important determinant of nurses’ hand washing behavior in a certain hospital, an educational strategy—although mostly effective for changing nurses’ behaviors—might not affect hand-hygiene compliance.

Probably the most promising way to select implementation strategies is to use relevant theories to go from the iden-

Table 2. Selected Examples of Strategies and Underlying Theories Matching Facilitators and Barriers for Implementation

Facilitator/barrier	Strategy	Theory
Knowledge	Active learning	Social cognitive theory
	Advanced organizers	Theories of information processing
Attitude	Shifting perspective	Health belief model
	Anticipated regret	Persuasion communication matrix Theory of planned behavior
Self efficacy	Modeling	Social cognitive theory
	Planning coping responses	Attribution theory Relapse prevention theory
Social norms	Role modeling	Social cognitive theory
	Leadership	Theory of quality management
Organization	Priority setting at organizational level	Theories on organizational culture
Financing	Financial incentives	Economic theories

Adapted from Bartholomew et al., 2006.

tification of determinants to the selection of strategies, especially where theories are supported by empirical evidence. A helpful overview of determinants and theory-proposed strategies is provided by Bartholomew, Parcel, Kok, and Gottlieb (2006; selected examples in Table 2) and a similar overview with a specific focus on the use of theories in the improvement of care was recently published (Grol et al., 2007). The overview by Bartholomew et al. (2006) clarifies that a choice of strategies is often available. Knowledge deficits for instance, could be addressed by active learning strategies (rather than traditional lectures) but could also be resolved by using advanced organizers in study materials. Advanced organizers are graphic models that clarify text structure by depicting key topics within the text and relationships between topics and thus improve understanding. Using such organizers is not only suggested by theorists of information processing, but supported by empirical evidence as well (Kools, Ruiter, van de Wiel, & Kok, 2007; Kools, van de Wiel, Ruiter, Cruys, & Kok, 2006; Kools, van de Wiel, Ruiter, & Kok 2006).

In the same manner, shifting perspective and anticipated regret can be valuable strategies to target attitudes. The barrier “hand hygiene prescriptions take too much time” from our previous example for instance, could be addressed with the use of shifting perspective. Whereas “takes too much time” is typically from the care giver perspective, one using the shifting perspective strategy could ask the workers to think of the frail 80-year-old patient in need of wound care as their mother and then to rethink whether they would consider lack of time an acceptable excuse for insufficient hygiene. As an alternative strategy, anticipated regret as proposed by several theorists, attempts to trigger feelings of regret using hypothetical situations. Healthcare workers who claim patient turning schedules for pressure ulcer prevention were too time consuming, could for instance be asked, “How would you feel if the patient developed

Table 3. Evidence for strategies aimed at improving hand hygiene in health care workers (33 studies)

No. of studies	Mostly effective	No. of studies	Mostly ineffective
7	Performance feedback	7	Education
5	Improved products	3	Reminders
3	Improved facilities		
1	Patient involvement		
1	Social influence		
12	<i>Combined strategies</i>		

a painful Grade 3 pressure ulcer after you did not comply with the turning schedule during your previous shifts.” Similar examples could be described for other determinants such as self efficacy, social norms, organization, and financing. These could show the potential of theorist-proposed strategies.

Use of Strategies—The Case of Hand Hygiene

Returning to our case of compliance with hand-hygiene prescriptions and known determinants (Table 1), we can consider strategies for promoting hand-hygiene adherence. A search of the literature by our own team into the effects of strategies for improving hand hygiene in hospital workers (all literature through 2005) resulted in the overview in Table 3. Researchers in a total of 33 studies evaluated strategies for improving hand hygiene and provided a pre- and post-evaluation of data from a comparison group where no strategies were delivered. Investigators reporting positive effects generally improved compliance to hand hygiene prescriptions from 45% to 60% of all relevant opportunities.

Results from this overview indicate that the use of education or reminders as single strategies do not improve compliance with hand-hygiene prescriptions, whereas the single use of either performance feedback, improved products, or improved facilities (e.g., more sinks or dispensers in the ward) probably does. Combined strategies were mostly effective. Often these strategies were education in combination with improved products or facilities, and either reminders or performance feedback. Finally, social influence and patient involvement were positively evaluated, but evidence was too scarce for drawing conclusions.

Most of the investigators did not provide a rationale for their choice of strategies. However, when we relate the use of strategies in previous studies to our known determinants (Table 1), it seems that determinants related to cognition, motivation in relation to irritation of the hands, routines, and resources were often addressed. Other determinants such as attitudes (takes too much time) and social influence (nobody controls, management not interested) were seldom addressed. This implies that to improve compliance with hand hygiene to exceed 60% of all relevant opportunities, nurses could especially consider strategies targeting attitudes and social influence such as shifting perspective, role modeling, and leadership.

Development, Execution, and Evaluation of the Implementation Plan

The analysis and judicious selection of strategies are probably the most crucial steps from the Grol and Wensing model. The implementation planners operationalize the strategies of choice into concrete actions, staff responsibilities, and time tables. Small-scale pilot testing of the implementation plan is generally recommended. Implementation plans are never static and can be altered after pilot testing or even after receiving the results of the process or outcome evaluation in the later step of the model for effective implementation. Evaluators should not only look into indicators in areas of healthcare workers actions (process indicators) and effects on patients' health or satisfaction (outcome indicators), but should also consider completeness and adequateness of strategy delivery. Without checking for this, we cannot be sure if a potential lack of effects was because of the strategy of choice or inadequate performance of the strategy during the course of implementation.

Conclusions

Our overview allows for some conclusions to be drawn. Issues of implementation deserve nurse researchers' full attention and scientific input. Various examples of persisting ineffective practices show the importance of the development of nursing implementation science. Setting an implementation agenda to address those areas where suboptimal care is most prominent deserves attention.

Our aim for this paper was to address common determinants of the persistence of ineffective practices or practice improvement, to discuss the effectiveness of implementation strategies, and to apply this to nurse-delivered patient care. Numerous factors can be determinants of successful change or resistance to change in nursing. Knowledge and cognitions, attitudes, routines, social influence, organizational characteristics, and resources are often relevant determinants. However, we can conclude that these general determinants provide “headings” rather than specific factors. Therefore, an analysis of relevant determinants for implementation should be performed to provide more operational and specific factors. Overlooking or “short-cutting” this step can be tempting but will likely result in unsuccessful implementation. Considering the full range of alternative strategies to choose from and reviewing the evidence for the effectiveness of strategies from systematic reviews of previous studies can keep us from overlooking possible strategies and can help us consider strategies with known effectiveness. Identification of strategies that match determinants of the specific innovation, target group, and context however, is key to well chosen strategies. Implementation strategies will be most successful where they match relevant determinants, are linked with relevant theoretical insights, and supported by evidence for either the theory or the effectiveness of the strategy itself.

Finally, we can conclude that the range of alternative strategies to choose from offers more than is currently used. Strategies focused on extrinsic motivation by addressing individual behavior, addressing groups rather than individuals, and focusing on organizational aspects, laws, and obligations are underused. They could offer alternative solutions from intrinsic motivation strategies that are probably overused.

Future Directions

The development of nursing implementation science needs more research. This research is much needed because generalizing results from physician-directed projects will not always be possible; the types of innovations, characteristics of the target group, and innovation context will often be different in nursing settings. Thorough evaluation of both implementation determinants and implementation strategies are needed and include the evaluation of actual strategy delivery (intention versus reality), a process analysis directed at experiences and critical reflections by target group members. Furthermore these evaluations should include implementation success in meeting preset targets, time, and costs invested in strategy delivery.

A second major direction for the future of nursing implementation science is the exploration of innovative or currently underused strategies. We conclude this paper with alternative suggestions for innovation in this area. We will discuss the potential use of patient-directed strategies, innovative strategies focused on individuals, group- or team-directed strategies and strategies directed at the organization or financing of care.

Patients are rarely involved in the implementation of innovations. Yet some examples of patient involvement are described. McGuckin et al. (2004) for instance evaluated the effects of instructing patients to remind hospital staff to perform hand hygiene. The study indicated a positive effect on staff compliance with hand-hygiene prescriptions. However, a down side to this strategy was that a substantial number of patients reported reluctance or uneasiness in reminding professionals. Ethical objections to this type of strategy are discussed by Entwistle (2007), who describes how such a strategy might increase patient burden because the implicit signal could be that patients cannot rely on basic elements of good care at a time of vulnerability. A way to avoid these negative elements could be to focus on what patients themselves could do. In the area of pressure-ulcer prevention for instance, patients are often unaware of risks until they actually develop a pressure ulcer. A patient-directed strategy could be to provide risk information and suggest how patients themselves could avoid pressure ulcers. This avoids checking up on healthcare personnel, yet could substantially add to prevention and patient empowerment rather than patient burden.

It would be worthwhile to study the effectiveness of communicating injunctive rather than descriptive norms. Whereas descriptive norms describe actual practice (e.g.

“compliance with hand hygiene prescriptions in hospital X contributes 50%”), injunctive norms describe what we think the situation should be (e.g., “We believe noncompliance with hand hygiene prescriptions is not acceptable as it threatens patient safety”).

We often communicate problematic practices such as high complication rates, low hand hygiene prescription compliance and so on. The risks of communicating in this way are addressed by Cialdini (2003), who published on communicating descriptive versus injunctive norms in the area of environmental issues. Cialdini experimented with communicating descriptive versus injunctive norms in a petrified forest where tourists’ desire to take fragments of the petrified trees as souvenirs was a threat to its preservation. Cialdini varied the use of signs along the route to communicate descriptive norms (e.g., “Many visitors take pieces of our petrified forest; please don’t threaten its preservation in this way”) on some days and injunctive norms (e.g., “The preservation of the petrified forest is important to us all; do not take fragments home”) on other days. Significantly more visitors took pieces of the forest home when the descriptive norms were presented. Cialdini’s hypothesis is that presenting descriptive norms is counterproductive because it can add to “normality” or even “acceptability” of a prevalent behavior.

Another worthwhile area for study in nursing is the target for strategies. Currently in nursing, strategies targeted at the intrinsic motivation of individuals are probably overused, because nursing is often a group activity. Examples of implementation strategies focused on group norms or interaction are seldom reported, but could be promising. These strategies could include norm-setting strategies, use of role models, social influence strategies, and leadership strategies. An example in the area of promoting hand hygiene was reported by Larson and colleagues (2000) who developed a comprehensive strategy for changing organizational culture, including elements such as leaders communicating their values, role modeling, and reinforcement by leaders. The strategy was tested in a quasi experiment in two hospitals and resulted in significant improvement in hand-hygiene behaviors. The strategy employed by Larson et al. is one example, but shows how group-directed strategies could be promising and deserve further studies.

Finally, we should consider research-evaluating strategies focused on organization or financial systems as potential innovations in nursing implementation science. A systematic review by Petersen et al. (2006) indicated positive or partially positive effects in a majority of studies focusing on the effects of financial strategies on quality of health care. More research in this area is needed however, and effects on the quality of nursing care have not been reported.

Organizational strategies directed at the successful introduction of innovations could be numerous. A systematic review by Laurant and colleagues (2005), for instance, showed how shifting care from physicians to nurses can lead to similar patient health outcomes and increased

patient satisfaction at the same time, an effect that is probably caused by additional tasks taken on by nurses.

A major challenge at the level of organizations however would be to move beyond “single project thinking” typical for most organizations. Single project thinking refers to the sequence of performing one project after another, each project aiming at the introduction of a single innovation (e.g., a project on falls prevention, followed by a project on pain management, followed by a project on hand hygiene). Several risks come with this approach. First, the implicit signal might be that other improvements cannot be accomplished during the course of a project (e.g., this year we focus on pain management). Second, the sequence of projects could be inefficient and does not recognize how many topics relate to overall quality of care and might ask for similar processes. For these reasons, exploring possibilities of concurrent implementation is worthwhile. A first example of this type of project is currently performed and focuses on the concurrent introduction of guidelines for preventing pressure ulcers, urinary tract infections, and falls (van Gaal, Schoonhoven, & van Achterberg, 2008).

Other options for innovative research in the area of implementation could be numerous and we merely presented a selection of examples for research focused on patients, individual nurses, groups, or teams and organizations. Considering such innovations is important, however, and can add to the body of knowledge in implementation science. Ultimately, this type of research should help us in our quest for evidence-informed practice.

Clinical Resources

- Reviews on effective quality improvement and implementation. <http://www.epoc.cochrane.org>
- Toolkit: Implementation of clinical practice guidelines. <http://www.rnao.org>
- Intervention mapping step 5: Adoption and implementation. <http://www.interventionmapping.com>

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