

Feature Article

Integrative Review of Implementation Strategies for Translation of Research-Based Evidence by Nurses

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Objectives:

The purpose of this review was to synthesize and critique experimental and/or quasi-experimental research that has evaluated implementation strategies for translation of research-based evidence into nursing practice.

Background:

Successfully implementing evidence-based research can improve patient outcomes. Identifying successful implementation strategies is imperative to move research-based evidence into practice.

Rationale:

As implementation science gains popularity, it is imperative to understand the strategies that most effectively translate research-based evidence into practice.

Description:

The review used the CINAHL and MEDLINE (Ovid) databases. Articles were included if they were experimental and/or quasi-experimental research designs, were written in English, and measured nursing compliance to translation of research-based evidence. An independent review was performed to select and critique the included articles.

Outcome:

A wide array of interventions were completed, including visual cues, audit and feedback, educational meetings and materials, reminders, outreach, and leadership involvement. Because of the complex multimodal nature of the interventions and the variety of research topics, comparison across interventions was difficult.

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Conclusion:

Many difficulties exist in determining what implementation strategies are most effective for translation of research-based evidence into practice by nurses.

Implications:

With these limited findings, further research is warranted to determine which implementation strategies most successfully translate research-based evidence into practice.

KEY WORDS:

guideline adherence, implementation, nurses, randomized controlled trials

Healthcare workers are responsible for providing the best possible care to their patients. However, patients are not consistently receiving safe and effective evidence-based care, leading to complications and increased healthcare costs.^{1,2} Up to 40% of patients do not receive healthcare according to current scientific evidence, and some patients receive unnecessary or harmful care.³

Successfully implementing research-based evidence can improve patient outcomes.^{4,5} Implementation science, the “study of methods to promote the integration of research findings and evidence into healthcare policy and practice,”^{6(p1)} has recently gained notoriety in the literature. Research has demonstrated that passive dissemination of evidence-based knowledge is an ineffective strategy to integrate research into practice.^{7–10} Several studies have noted that using multimodal implementation strategies that are tailored toward identified barriers and facilitators are more effective than single implementation strategies.^{1,11–15} To improve patient outcomes, decrease variability in practice, and decrease adverse patient events, there is a need to determine the most effective strategies for implementing research-based evidence into practice.

Several studies and reviews have been completed assessing the effectiveness of different interventions strategies.^{16–19}

These studies, however, have primarily focused on how the implementation strategy affects practices of physicians and/or healthcare professionals in general. There have been few studies that have specifically assessed how different implementation strategies affect nursing practice specific to the nurse's compliance in translation of research-based evidence to the bedside. Implementation literature in nursing has focused instead on theoretical frameworks and barriers to/facilitators of implementing research-based care.^{20–22} To the author's knowledge, no integrative review of implementation strategies for translation of research-based evidence specific to nursing has been completed.

According to Weng et al,²³ among 6 different groups of healthcare professionals, physicians reported implementing evidence-based practice the most ($P < .001$), with nurses implementing evidence-based practice the least. Positive attitudes toward and beliefs in evidence-based practice were also significantly lower among nurses ($P < .001$) than in the other 5 groups.²³ Nurses comprise the majority of healthcare workers and warrant focused attention on how to increase their utilization of best practices found in research.²⁴ The purpose of this review was to synthesize and critique experimental and/or quasi-experimental research that has evaluated implementation strategies for translation of research-based evidence into nursing practice in order to identify successful approaches for future use.

METHODS

A systematic approach was used to identify articles examining implementation strategies aimed at translating research-based evidence into practice. Articles were included if they were experimental and/or quasi-experimental research designs and written in English. Furthermore, the intervention needed to be focused on implementation strategies to improve compliance of integration of research-based evidence into practice in order to be included in the review. Articles were excluded if the main outcome measured how the intervention affected only the patient, physician, and/or other healthcare members. Only those articles that specifically measured nursing compliance were included. There was no limit set on the year of publication for this review. The search was performed using both the Cumulative Index to Nursing and Allied Health Literature and MEDLINE (Ovid) databases.

Several key words were searched including *guideline adherence, implementation, program implementation, nurses, randomized controlled trial, and intervention study*. Other key words included *practice guidelines, evidence-based nursing, nursing evaluation research, practice facilitation, intervention strategies, implementation strategies, and diffusion of innovation*.

One rater independently reviewed and critiqued the full text articles using the Transparent Reporting of Evaluations with Non-randomized Designs statement, as well as the Consolidated Standards of Reporting Trials statement to evaluate

the quality of the included studies.^{25,26} Detailed information from each article pertaining to the study's aim, implementation strategy, control group interventions, outcome measures, and success of the intervention based on compliance of translation by nurses was abstracted into Table, Supplemental Digital Content 1, <http://links.lww.com/NUR/A3>. The reviewer evaluated and labeled each study's implementation strategy as either "not successful," "partially successful," or "successful" based on the nurse's compliance of translating research-based evidence into practice. "Not successful" strategies included those that did not show a statistically significant improvement in nurse compliance ($n = 1$), whereas those labeled as "partially successful" showed statistically significant improvements in at least 1 implementation strategy and/or compliance with at least 1 outcome (ie, some studies measured compliance with several different research-based recommendations) ($n = 3$). "Successful" implementation strategies showed statistically significant improvement in compliance from at least 1 intervention group ($n = 4$).

RESULTS

A total of 435 articles were included in the initial screening process, with 307 titles excluded, as they either were not focused on improving translation of research-based evidence, were nonintervention studies, or were duplicates. Abstracts of the remaining 128 articles were then screened with 120 excluded. The excluded articles did not have interventions aimed at implementation strategies and/or did not measure nursing compliance. Full texts of the remaining 8 articles were critiqued and included in this review.

Because of the numerous amounts of interventions and variety of topics studied, it was difficult to compare the effectiveness across each implementation strategy and study. Comparison was also difficult because each study operationalized their strategies in a myriad of different ways. Furthermore, the specific details of the interventions were not provided in many studies. Even when details of how the intervention was operationalized were included in the study's methods, the precise content of the strategy was not presented. Because of these limitations, an integrative review was deemed more appropriate than a meta-analysis. According to Torraco,²⁷ an integrative review is "a form of research that reviews, critiques, and synthesizes representative literature on a topic in an integrated way such that new frameworks and perspectives on the topic are generated."^{27(p356)} Guidelines for conducting integrative reviews were used to guide this synthesis.²⁸

Three of the retrieved articles were published in nursing journals,^{29–31} whereas the other 5 articles were published in medical journals.^{32–36} All of the articles were published within the last 7 years, with most of them ($n = 7$) published since 2010. The majority of the interventions ($n = 5$) were implemented between 2006 and 2010,^{29,30,32,33} and 1 intervention was implemented between June 2000 and

November 2001.³⁶ The remaining 2 articles did not include dates of implementation.^{34,35} The duration of the interventions ranged from 4 to 36 months (including baseline and follow-up), with an average of 16.4 months (mode of 14 months).^{29–33,36}

Design

As shown in Table, Supplemental Digital Content 1, half of the articles ($n = 4$) implemented interventions aimed at increasing hand hygiene compliance, <http://links.lww.com/NUR/A3>.^{30,32–34} Beeckman et al²⁹ and Sutherland-Fraser et al³¹ focused on implementing pressure ulcer prevention practices. The remaining 2 articles evaluated interventions for heart failure and urinary incontinence.^{35,36}

Most of the articles were randomized controlled trials ($n = 7$); 5 studies randomized participants at the ward or hospital level,^{29,30,32,33,35} whereas the 2 other studies randomized at the individual clinician level.^{31,33} One study was a pre-post intervention study that did not include randomization.³¹ An intention-to-treat analysis was used in 3 of the hand hygiene compliance studies.^{30,32,33}

Sample

Two-thirds ($n = 5$) of the studies were conducted in Europe.^{29,30,32,33,35} Two studies were completed in the United States and 1 in Australia.^{31,34–36}

Five of the interventions were implemented within hospital settings,^{30–34} and 1 study was conducted with nursing home healthcare workers.²⁹ Of the studies that were conducted in hospitals, a variety of wards were included, ranging from intensive care units, medical-surgical floors, pediatric wards, to perioperative areas. The remaining 2 studies were conducted with community or home healthcare nurses.^{35,36}

Per inclusion criteria of this review, nurses participated in all studies. Other healthcare professionals in addition to nursing (ie, physicians, occupational therapists, etc) were included in 4 studies.^{29,32–34} Across all 8 articles, there were a total of 3134 participating nurses, with 70% ($n = 2733$) of these nurses coming from a single study.³⁰ There were a total of 273 nonnurse participants. In 1 article, the precise number of healthcare workers was not provided, only stating that 60 wards were included.³²

Interventions

Throughout the 8 studies, several implementation strategies were utilized (see Table, Supplemental Digital Content 1, <http://links.lww.com/NUR/A3>). Six of the articles utilized more than 1 implementation strategy and were multimodal.^{29–31,33,35,36} Three of these 6 articles mentioned the importance of tailoring intervention strategies to incorporate barriers and facilitators; however, only 2 designed tailored, multimodal interventions.^{29,30,35}

A framework was utilized to guide the development of the interventions in 4 studies, including Grol and Wensing's model for effective implementation,²⁹ the Medical Research Council's framework for complex interventions coupled with the Operant Learning Theory,³² the Health Belief Model,³⁴ and the Precede-Proceed Model.³⁶ However, whether the study included a guiding framework did not have any effect on the success of the intervention.

Whereas it was difficult to compare interventions and outcomes across all 8 articles because of the complexity of differing strategies and topics, there were 7 main overall intervention themes that emerged (Table 1): (a) visual cues, (b) audit and feedback, (c) educational meetings, (d) educational materials, (e) reminders, (f) outreach, and (g) leadership involvement. Both visual cues³⁴ and leadership involvement³⁰ were used only once. Educational meetings and reminders were the most frequently used strategies, with both utilized in 4 of the studies.^{29–31,33,36}

Even within these broad overall themes, however, each study operationalized the strategies differently. Nevo et al³⁴ implemented a variety of visual cues to increase hand hygiene compliance. Leadership involvement was described by Huis et al³⁰ as gaining active commitment of management, modeling good behavior by informal leaders, and setting norms and targets within the team. Educational meetings varied between small group sessions²⁹ and audiovisual presentations.^{30,31,33} Reminders came in the forms of posters^{29,31,33} and e-mails.³⁶ Huis et al³⁰ and Fuller et al³² implemented simple audit and feedback interventions to improve hand hygiene compliance. Cheater and colleagues³⁵ audit and feedback intervention involved mailing individual nurses feedback on their performance regarding urinary incontinence management, highlighting the nurses' good practices, opportunities for improvement, and suggestions on how to achieve change. Beeckman et al²⁹ also utilized an audit and feedback method, along with various other methods; however, the authors did not provide detail on how the audit and feedback process was operationalized. Educational materials included a variety of resources, including CD-ROM, pocket cards, Web site links, and resource folders^{29,31,36}; however, detailed information about the content of these educational materials was not provided. Outreach strategies included in-person visits³⁵ as well as e-mail outreach.³⁶ One study utilizing an outreach method did not provide detail as to how this was completed.²⁹ Each study implemented these strategies in a variety of ways. Because of this, along with the multimodal nature of the interventions and array of topics, many articles lacked the detail required for replication of the intervention strategies.

Outcomes

Several interventions were used across the 8 studies. See Table 1 for an overview of the articles' interventions and success of compliance. As previously mentioned, success

Table 1. Overview of the Articles' Objectives/Aims, Interventions, Control Groups, Outcome Measures, and Success of the Intervention Based on Compliance of Translation by Nurses

Authors, Year	Objective/Aim	Implementation Intervention	Control	Outcome Measures	Success of Intervention
Beeckman et al (2013)	To determine if a multifaceted strategy to implement an electronic clinical decision support system would improve adherence to PU prevention recommendations	<ul style="list-style-type: none"> • Appointment of key nurse • Diagnostic interview • Multidisciplinary team • Creation of best practice guidelines • Theoretical training about PU prevention • Interactive small group sessions with clinical decision support education • CD-ROM distribution • Web site links about PU classification • Small group case discussions • Monthly AF • Reminders • Posters • Flyers • Daily reminders during shift change • Pocket card • Review of PU prevention material • Organizational support on delivery of PU prevention materials 	<ul style="list-style-type: none"> • Standard protocol developed and passive dissemination • 30-min lecture presented 	<ul style="list-style-type: none"> • Risk assessment • Skin observation • Prevention (surface, repositioning frequency, offloading of heels) • PU prevalence 	Partially successful <ul style="list-style-type: none"> • Statistically significant improvement in PU prevention when resident seated in a chair ($P = .003$) • Statistically significant lower proportion of residents receiving no prevention while seated in chair or in bed ($P = .001$) • No statistically significant improvement in PU prevention when resident in bed ($P = .3$)
Cheater et al ³⁵ (2006)	To evaluate the effectiveness of 4 different interventions in prompting improvements in community nursing practice and patient outcomes for those patients diagnosed with UI	AF group: <ul style="list-style-type: none"> • Mailed personal feedback on nurses' performance from baseline audit • Aggregated feedback on other study nurses' performance • Resource pack with printed educational materials on bladder function, types of UI, advice on therapy; did not contain evidence-based recommendations on best practice EO group: <ul style="list-style-type: none"> • Mailed personal feedback on nurses' self-reported barriers to providing optimum UI care • Aggregated feedback on other study nurses' reported barriers • Outreach visits by a trained "link nurse" • Follow-up phone calls from "link nurse" AF and EO combined group: <ul style="list-style-type: none"> • Combination of above interventions 	<ul style="list-style-type: none"> • Received educational resource packet 	<ul style="list-style-type: none"> • Nurse performance as measured by nursing documentation of assessment and management of UI 	Not successful <ul style="list-style-type: none"> • No statistically significant difference between 4 arms for nurse performance

(continues)

Table 1. Overview of the Articles' Objectives/Aims, Interventions, Control Groups, Outcome Measures, and Success of the Intervention Based on Compliance of Translation by Nurses, Continued

Authors, Year	Objective/Aim	Implementation Intervention	Control	Outcome Measures	Success of Intervention
Fuller et al ³² (2012)	To determine if a behaviorally designed feedback intervention would improve HHC compared with routine practice	<ul style="list-style-type: none"> Weeks 1 and 2: 20-min observations followed with immediate feedback and formation of an action plan for noncompliant individuals; individuals praised if they were compliant Week 3: 20-min observation and group compliance recorded (no feedback given) Week 4: 20-min observation and group compliance recorded with feedback and action plans formulated at a ward meeting 	<ul style="list-style-type: none"> Usual care 	<ul style="list-style-type: none"> HHC (expressed as percentages) measured by direct observation using the Hand Hygiene Observation tool 	Partially successful <ul style="list-style-type: none"> Statistically significant improvement in HHC in intensive care units ($P < .001$) but not general medicals wards ($P = .5$)
Huis et al ³⁰ (2013)	To determine whether an innovative, theory-based, team- and leader-directed strategy would be more effective than a literature-based state-of-the-art strategy in increasing HHC rates among nurses	State-of-the-art strategy: <ul style="list-style-type: none"> Education for improving knowledge and skills Reminders for supporting the actual performance of hand hygiene Feedback Adequate products and facilities Team- and leader-directed strategy: <ul style="list-style-type: none"> State-of-the-art strategy Gaining active commitment and initiative of ward management Modeling appropriate hand hygiene behavior by informal leaders at the ward level Setting norms and targets within the team 	<ul style="list-style-type: none"> No control group (2 intervention groups) 	<ul style="list-style-type: none"> HHC expressed as percentages Presence of jewelry, long sleeved clothes under uniforms, and compliance with specific types of hand hygiene opportunities 	Successful <ul style="list-style-type: none"> Statistically significant improvement in HHC for team and leaders directed strategy vs state-of-the-art strategy ($P < .001$) Statistically significant improvement in team- and leader-directed strategy over state-of-the-art strategy for jewelry/ long sleeve compliance ($P < .001$)
Martin-Madrado et al ³³ (2012)	To determine the effectiveness of a multimodal intervention to improve HHC in healthcare professionals in primary care	<ul style="list-style-type: none"> Four sessions of 50 min each for healthcare center <ul style="list-style-type: none"> Video presentation Hand hygiene demonstrations Hydroalcoholic preparation tinted with fluorescent dye to determine visible disinfection on healthcare workers' fingertips Hydroalcoholic solution placed in each healthcare center's consultation offices Reminder posters regarding infection control measures posted at key points 	<ul style="list-style-type: none"> Usual care 	<ul style="list-style-type: none"> HHC expressed as percentages 	Successful <ul style="list-style-type: none"> Statistically significant improvement in HHC in primary healthcare workers compared with baseline data ($P < .001$)

(continues)

Table 1. Overview of the Articles' Objectives/Aims, Interventions, Control Groups, Outcome Measures, and Success of the Intervention Based on Compliance of Translation by Nurses, Continued

Authors, Year	Objective/Aim	Implementation Intervention	Control	Outcome Measures	Success of Intervention
Murtaugh et al ³⁶ (2005)	To determine the effectiveness of 2 interventions designed to improve the adoption of heart failure evidence-based practices by home health nurses	<p>Basic e-mail:</p> <ul style="list-style-type: none"> • Package of materials e-mailed to participants • Pocket card with medication management information • Prompter card to improve nurse's communication with physicians • Self-care guide for patients <p>Augmented intervention:</p> <ul style="list-style-type: none"> • Basic e-mail including package of materials, pocket card, prompter card, and self-care guide • Outreach by an expert CNS <ul style="list-style-type: none"> ◦ Standard e-mail from CNS 1 wk after basic e-mail about patient's status, usefulness of heart failure self-care guide, and if the nurse or patient had any issues they would like to discuss 	<ul style="list-style-type: none"> • Usual Care 	<ul style="list-style-type: none"> • Nurse assessment practices as measured by nursing documentation • Nurse instructions/ education to patients as measured by nursing documentation of patient education 	<p>Successful with augmented intervention</p> <ul style="list-style-type: none"> • Nurses in both intervention groups showed a statistically significant improvement with the comprehensive assessment measure (basic e-mail $P = .006$; augmented intervention $P < .001$) • Augmented group more likely to record assessment of medication adverse effects ($P = .03$), instruct patients about when to contact the physician ($P = .014$) and to give the self-care guide ($P < .001$) • Greater number of statistically significant effects for the augmented group
Nevo et al ³⁴ (2010)	To assess the efficacy of various cues to improve HHC upon entering (pre) and exiting (post) a simulated patient environment	<ul style="list-style-type: none"> • Baseline (control group) • Baseline and flicker: dispenser in baseline location and enhanced with flashing lights • Line of sight: dispenser and poster moved to line of site on entering room • Line of sight and flicker: dispenser moved to line of sight and enhanced with flashing lights • Warning sign: same as baseline setting, only with a sign outside stating "Warning! This room is under electronic surveillance for HHC. Failure to perform hand hygiene within 10 s of entry will trigger an alarm. The violation will be reported!" 	<ul style="list-style-type: none"> • Baseline data group served as control 	<ul style="list-style-type: none"> • HHC expressed as percentages 	<p>Successful with warning-sign group</p> <p>Partially successful in line-of-sight and flicker group</p> <ul style="list-style-type: none"> • Statistically significant improvement of HHC for pre-examination in line-of-sight and flicker groups ($P = .02$) • Statistically significant improvement of HHC for warning-sign group both pre ($P < .02$) and postexamination ($P < .001$)

(continues)

Table 1. Overview of the Articles' Objectives/Aims, Interventions, Control Groups, Outcome Measures, and Success of the Intervention Based on Compliance of Translation by Nurses, Continued

Authors, Year	Objective/Aim	Implementation Intervention	Control	Outcome Measures	Success of Intervention
Sutherland-Fraser et al ³¹ (2012)	To determine if an educational intervention would improve perioperative nurses' knowledge and practices regarding PU assessment and prevention strategies	<ul style="list-style-type: none"> • 30-min audiovisual presentation outlining pressure injury risks and prevention strategies • Resource folder of educational material, additional reference material and policy documents with a companion CD-ROM • Reminder posters on key points from presentation 	• No control group	• Self-reported knowledge and practice as measured by a researcher-developed 48-item questionnaire	Partially successful Statistically significant improvement for the following outcomes: <ul style="list-style-type: none"> • Accurately describing PU stages ($P = .001$) • Reassessment of stage 1 on patients' heels ($P = .05$) • Decrease in no. of nurses who would massage a stage 1 or 2 ($P = .02$) • Use of a PU risk assessment tool along with clinical judgment ($P = .0001$)

Abbreviations: AF, audit and feedback; CNS, clinical nurse specialist; EO, educational outreach; HHC, hand hygiene compliance; PU, pressure ulcer; UI, urinary incontinence.

of the intervention was based on the compliance of translation by nurses. The interventions were listed as “not successful,” “partially successful,” or “successful.” Whereas some studies also included patient-related outcomes, only nursing compliance to translation of research-based evidence was included in this review. Compliance to research-based practices was the main outcome measured in the studies. Beeckman et al²⁹ assessed compliance to guideline-based care recommendations for pressure ulcer prevention with an algorithm based on a previous pilot study. Self-reported improvement in practice as measured by a researcher-developed 48-item questionnaire was used to measure compliance by Sutherland-Fraser et al.³¹ Cheater et al³⁵ and Murtaugh et al³⁶ both assessed compliance of nurse performance by completing chart audits on the nurses' documentation against evidence-based review criteria for the assessment of urinary incontinence and heart failure management, respectively. Reviewers from these studies pulled information from patients' charts to identify nurse's compliance with appropriate documentation of assessment, management, and patient education. Compliance was measured by observation in the 4 studies whose strategies focused on increasing hand hygiene compliance. Of these 4 studies, 3 provided information on training the observer completed, which ranged from a 1.5-hour to a 2-day training course.^{30,32,33} Fuller et al³² utilized a reliable Hand Hygiene Observation Tool, whereas the other studies relied on observation alone.

DISCUSSION

Translating research-based evidence into practice has been shown to improve patient outcomes. Many evidence-based guidelines have been created; however, there remains a gap

between research and practice.^{2,3,7} To bridge this gap, intervention studies aimed at effective implementation strategies are gaining notoriety in the literature. There is currently a lack of research that links the effects of the implementation intervention back to compliance of the healthcare provider. Because nurses comprise the majority of healthcare workers and have the most direct contact with patients, it is important to identify research that specifically addresses this population.²⁴ The purpose of this review was to critique research on implementation strategies for translation of research-based evidence to the bedside by nurses.

The 2 most common topics examined in this review was hand hygiene compliance and pressure ulcer prevention. Hand hygiene is noted to be the most effective way to decrease the potential for infection; however, nurses, along with other healthcare providers, have very poor hand hygiene compliance.³⁷⁻⁴⁰ Because hand hygiene is so important, it is no surprise that half of the reviewed articles focused on improvement of hand hygiene compliance.

Two articles primarily examined compliance to pressure ulcer prevention guidelines. Pressure ulcers have been rated within the top 5 adverse events in Western countries and can decrease quality of life.⁴¹⁻⁴³ This harm is considered to be largely preventable and is a priority for most institutions.⁴¹⁻⁴³ The other topics studied, urinary incontinence and heart failure, were considered a high priority to the participating institutions. Each of these studies noted adverse events associated with these preventable issues and designed interventions aimed to decrease poor outcomes.^{36,44,45}

Literature suggests that the most successful implementation strategies are multimodal and tailored toward identified barriers and facilitators to implementation.^{1,11-15} All but 2 articles utilized multimodal intervention strategies; however,

many of these strategies were cumbersome and did not include the detail warranted for translation.

Furthermore, 4 studies mentioned the importance of tailoring interventions based on barriers and facilitators; however, only 3 of these studies incorporated this knowledge in the design and development of the intervention. The success of the multimodal, tailored interventions that these 3 articles utilized varied greatly. One study's outcomes were not successful, one partially successful, and the final study demonstrated successful outcomes. These findings may challenge the notion set forth in previous literature as to the importance of multimodal tailored strategies; however, this finding should be evaluated with caution, as only a small number of articles narrowly focused on nursing compliance were included in this review. Other literature focused on patients and/or nonnursing outcomes may have yielded different results.

Leadership has also been noted in the literature as being a driving force behind effective implementation strategies.⁴⁶⁻⁴⁹ Interestingly, only 1 article, focused on hand hygiene compliance, utilized an intervention strategy that purposefully included leadership involvement. This article found statistically significant improvements in nursing compliance, and the intervention regarded as "successful."³⁰ Whereas leadership involvement is supported in previous research, 3 other articles that had "successful" outcomes did not include leadership involvement as part of the intervention strategy. This finding may question the importance of leadership involvement; however, this should also be evaluated with caution (Table 2).

Several different implementation interventions were utilized including visual cues, audit and feedback, educational meetings and materials, reminders, outreach, and

leadership involvement. Increasing the number of different strategies implemented did not necessarily equate to more successful outcomes. All implementation strategies were utilized at least once in those studies that yielded "successful" outcomes; however, the majority of these strategies were also utilized in studies which outcomes were deemed "partially successful" and "not successful."

Nurses' compliance to research-based practice recommendations was the main outcome for this review. One study measured nurses' compliance to pressure ulcer prevention recommendations with an algorithm based on a previous pilot study; however, reliability and validity data on this algorithm were not included. In another study, nurses were asked to complete a research-developed questionnaire to measure self-reported practice improvements. This tool was reviewed for face validity only, and no reliability data were provided. Also, using self-reported data has limitations. Self-reported data can rarely be independently verified, as well as the nurses could have exaggerated their improvements in research-based practice recommendations.⁵⁰ Two studies measured compliance by reviewing nursing documentation to assess for an increased compliance with guideline recommendations. However, the implementation strategy sought to improve the nurses' compliance to recommended assessment, management, and patient education skills, not their documentation skills. Also documentation may not adequately reflect nurses' practice.³⁶ Finally, hand hygiene observations may produce the Hawthorne effect in nurses, and any increase in hand hygiene compliance may have been due to the nurses knowing they were being observed. In addition, 3 of the 4 interventions that were deemed "successful" were focused on hand hygiene compliance. These designs may have seen a greater improvement

Table 2. Overview of Intervention Strategies Used by Authors and Success of Intervention Based on Compliance of Translation by Nurses

Author/Year	Visual Cues	Audit and Feedback	Educational Meetings	Educational Materials	Reminders	Outreach	Leadership Involvement	Success of Outcome
Beeckman et al (2013)		√	√	√	√	√		Partially successful
Cheater et al ³⁵ (2006)		√				√		Not successful
Fuller et al ³² (2012)		√						Partially successful
Huis et al ³⁰ (2013)		√	√		√		√	Successful
Martin-Madrado et al ³³ (2012)			√		√			Successful
Murtaugh et al ³⁶ (2005)				√	√	√		Successful
Nevo et al ³⁴ (2010)	√							Successful
Sutherland-Fraser et al ³¹ (2012)			√	√	√			Partially successful

due to the relatively simple nature of hand hygiene observation. Also, even though the majority of these studies required observers to attend training courses, hand hygiene compliance is a somewhat subjective measure, which could skew the data depending on the observer.⁵¹

There are several limitations to this review. Within this review, a thorough literature search was conducted; however, only 1 reviewer identified the selected articles, and there may have been an incomplete retrieval of articles that met the inclusion criteria. This critique had a narrow scope and sought to review only those studies that evaluated how implementation strategies affected nursing compliance, yielding a small selection of only 8 articles. Other studies involving patient and other healthcare providers may have reached different conclusions about the success of various strategies.

CONCLUSION

Translating research-based evidence into practice is of utmost importance to improve patient outcomes. Research aimed at how to implement these research recommendations within nursing is relatively scant. This review sought to critique the existing research on implementation strategies in order to pinpoint the most beneficial strategies. Further research is warranted to better understand which strategies should be utilized to best implement research-based evidence to nursing. Identifying these strategies will help to increase compliance and adherence to evidence-based standards, ultimately improving patient outcomes and decreasing variance in care and adverse events.

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