# The Effectiveness of Four Translation Strategies on Nurses' Adoption of an Evidence-Based Bladder Protocol

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## ABSTRACT

The primary purpose of this study was to examine the effects of an intervention consisting of the four translation strategies of educational materials, educational meetings, reminders, and audit and feedback on nurses' adoption of an evidence-based bladder program for patients with stroke in an acute care setting. The secondary purpose was to evaluate the difference in incontinence episodes of patients with stroke before and after nurses received the intervention. Finally, the purpose was to evaluate the influence of nurses' attitudes and the demographic characteristics on the adoption and use of the evidence-based bladder program after receiving the intervention. This study was the first to provide empirical support for the influence of the combination of these four translation strategies and nurses' attitudes toward research on the adoption of evidence-based practice in a time-series design study. Thus, the combined use of the four translation strategies did have an impact on nurses' adoption of evidence-based practice.

**Keywords:** bladder retraining protocol, evidence-based protocol, nurses' adoption behaviors, nurses' attitudes, prompted voiding, translation science, translation strategies

This research examined the use of translation strategies and nurses' attitudes to increase the use of evidence-based practice among neuroscience nurses in the acute care setting. Translation science, in the context of this study, is the scientific study of methods that affect adoption of evidence-based practice by healthcare providers (HCPs) on the individual and organization levels to improve patient outcomes and operational decision making (Titler, 2004). Use of evidence-based practice relies on the clinician's expertise, along with the best available external clinical evidence from research and/or evidence-based theories, opinions from expert leaders, evidence from the patient's assessment, and data about patient preferences. The best evidence is clinically relevant research, often from the basic sciences of medicine but especially from patient-centered clinical research (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). In addition, evidence-based practice is the deliberate use of the best available evidence for making decisions about the care of individual patients. Research utilization is the use of research in clinical practice and is only one of the many components underpinning evidence-based practice and translation science (Frasure, 2008).

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An extensive review and synthesis (Frasure, 2006) evaluated evidence of the effectiveness of the four translation strategies of educational materials, educational meetings, reminders, and audit and feedback. Evidence demonstrated that all four strategies were effective in improving patient outcomes by targeting provider behavior. In most studies, these strategies were used in combination with each other or in combination with other strategies.

Educational materials are defined as the distribution of published or printed recommendations for clinical care. Educational meetings include lectures, workshops, conferences, or in-services for HCPs. Reminders involve information intended to prompt an HCP to perform or avoid some action relevant to individual patient care. Audit and feedback denote summaries and reports of clinical performance of healthcare over a time period (Grimshaw et al., 2004).

Evidence from a recent meta-analysis indicated that educational materials alone had a modest effect (>5% and ≤10%) on guideline implementation; educational meetings had a small effect (≤5%); audit and feedback had a modest effect; and reminders, the most commonly studied single strategy, had a moderate effect (>10% and ≤20%). Other important findings from the same meta-analysis were as follows: (a) the grouping of educational materials and reminders appeared to be more effective than materials only; (b) educational meetings and reminders appeared more effective than meetings alone; and (c) the combination of educational materials, meetings, and reminders were possibly more effective than the combined use of educational materials and

meetings (Grimshaw et al., 2004). Much of the research on these four strategies focused on evidence-based practice change by physicians. This study evaluated the effectiveness of these four strategies in the adoption by nurses of an evidence-based bladder protocol in the acute care phase of the patient with stroke.

The primary translation strategy of this study, the clinical practice guideline (CPG), was one of the many educational materials used. The CPGs are systematically developed statements intended to guide healthcare practitioners' decisions about the best care for specific clinical conditions. Many CPGs for the care of the patient with stroke were available, but none contained specific bladder protocol guidelines (Duncan et al., 2005; Teasell, Foley, Salter, & Bhogal, 2007). The HCPs are under increased pressure to streamline care and decrease costs by using CPGs. In addition, guidelines have the potential to encourage effective interventions and discourage ineffective interventions (Grimshaw et al., 2004).

In a systematic review by Estabrooks and colleagues, of the six determinants of research utilization, only one had a positive association, namely individual beliefs and attitudes (Estabrooks, Floyd, Scott-Findlay, O'Leary, & Gushta, 2003). Furthermore, Champion and Leach noted that nurses' attitudes were important predictors of behavior (Champion & Leach, 1989). When targeting dissemination and implementation strategies to improve patient care and outcomes, nurses' attitudes toward research utilization in practice must be considered.

## Methods

### *Design and Consent*

A time-series design, using eight 1-week time points before the intervention and 16 one-week time points after the intervention, was used to obtain the required sample. To meet design requirements, data were collected over an extended period, and an intervention was introduced during the time period. The intervention consisted of the use of four translation strategies of educational materials (prompted voiding algorithm, Figure 1), educational meetings (staff education), reminders (e-mail messages and bulletin board updates), and audit (chart review data) and feedback (e-mail messages and bulletin board updates). The purpose of the intervention was to teach and encourage nurses to adopt a prompted voiding algorithm for patients with stroke. The Research Utilization Survey was used to evaluate the influence of nurses' attitudes and demographic characteristics on the adoption and use of the evidence-based bladder program after receiving the intervention.

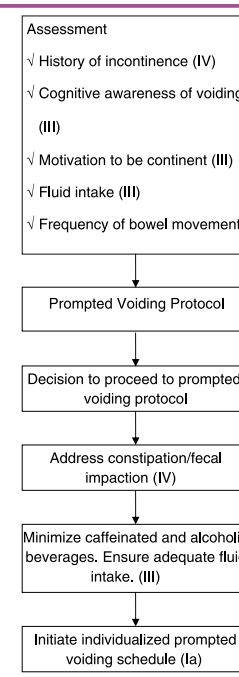
Permission to conduct the study was obtained from the local institutional review board and the hospital research committee. Upon obtaining informed consent before intervention, the nurses were asked to complete the Research Utilization Survey.

Translation science encompasses a number of components to enhance evidence-based clinical decision making, including the use of clinical practice guidelines as described in this study.

### *Study Setting and Sample*

The medical record sample was selected from patients with stroke on a 40-bed neuroscience acute care unit affiliated with a 695-bed academic medical center. The unit provided care for approximately 60 patients with stroke per month with an average length of stay (LOS) of 7 days per patient. The percentage of patients with stroke admitted with urinary incontinence varies in the literature. Forty percent of the participants were reported to have urinary incontinence in a study examining stroke outcomes (Patel, Coshall, Rudd, & Wolfe, 2001). In addition, a review of the literature reported that 32%–79% of hospitalized patients with stroke experienced urinary incontinence (Brittain, Peet, Potter, & Castleden, 1999). These data were used in estimating that it would require

**FIGURE 1 Prompted Voiding Algorithm With Levels of Evidence**




*Registered Nurses' Association of Ontario.* Retrieved November 10, 2007, from http://rnao.org

weeks to obtain an adequate sample of medical record data from 29 chart reviews.

The study nurse sample consisted of 33 registered nurses who were recruited on the following criteria: nurses whose primary unit of employment was neuroscience and had the ability to read, write, and understand English. Twenty of the thirty-three (61%) nurses agreed to participate in the Research Utilization Survey, before and after intervention. The 33 nurses who participated in the use of the evidence-based bladder protocol utilized the protocol at least once while providing care to a patient with stroke.

### Instruments

Adoption was measured with an investigator-developed chart review form using activities specified on the prompted voiding protocol as the process indicators of adoption. Adoption was measured by the total scores of the process indicators for the nurses' adoption behaviors. For 12 of the process indicators (15 in total), the percent of adoption behaviors was determined by assigning "yes" (100%) or "no" (0%) to the process indicators. One example of a yes/no process indicator was "history of incontinence documented?" For process indicators 2, 4, and 9, the score was the calculated percent of the nurse behaviors determined by dividing the documented behaviors by the number of behaviors that should have been documented. The total adoption score was the sum of scores of all process indicators divided by the number of applicable indicators.

Nurses' attitudes toward research utilization and research were operationalized using the Research Utilization Survey, adapted to a 41-item survey by Kenny (2002). Initial internal consistency reliability for the research utilization subscales has been reported as $\alpha = 0.77–0.91$. Content validity was assessed by an expert panel and data from a pilot study. Construct validity was supported by the use of structural equation modeling (Estabrooks, 1999). Rationale for choosing this instrument was based on a critical analysis of 14 instruments. This questionnaire was selected for use in this study because of the strong reliability and validity (Frasure, 2008).

### Procedure

The intervention consisted of the use of the aforementioned translation strategies. The purpose of the intervention was to teach and encourage nurses to adopt a prompted voiding algorithm for patients with stroke in a neuroscience acute care setting. The intervention lasted 3 weeks or until data indicated that opportunities to implement the prompted voiding were seldom missed.

Quantitative measurements included nurses' adoption behaviors, incontinence episodes, and nurses' research utilization and attitudes scores. The Research Utilization Survey and investigator-developed demographic form were used to evaluate the influence of nurses' attitudes and demographic characteristics on the adoption and use of the evidence-based bladder program after receiving the intervention. Demographic characteristics were measured to allow for evaluating their influence on nurses' attitudes toward research utilization and research.

### Data Analysis

Power analyses for the nurse and the medical record sample size determinations were done in the general power analysis program, G*Power (Erdfelder, Paul, & Buchner, 1996). Statistical Package for Social Sciences (SPSS) computer software program (SPSS, 2007) was used to analyze the chart review form data and the nurses' research utilization and research attitude scores. The dependent variables (DVs; nurses' adoption rates and incontinent episodes) were analyzed using an autoregressive integrated moving average model. Paired-samples *t* tests were performed on the total scores of each of the Research Utilization Survey's subscales. A standard multiple regression was conducted to evaluate the relationships among the adoption rate, nurse demographic characteristics, and nurses' research attitudes scores. The DV, adoption rate, was regressed onto the independent variables (IVs) of age, basic nursing education, highest completed level of formal nursing education, years worked as a nurse, years worked at this hospital, and nurses' research attitude scores.

## Results

Demographic data and baseline characteristics are summarized in Table 1. Of the 33 nurses, 31 were women (93.9), and 2 were men (6.1%). Ages ranged from 22 to 57 ($M = 33.8$) years in the study sample, and most of the nurses in the nurse sample had completed the baccalaureate degree (51.5%).

Mean scores, standard deviations, skewness, kurtosis, and ranges (Table 2) for adoption/assimilation (nurses' adoption rates), overall, direct, indirect, and persuasive research utilization and attitudes toward research (Research Utilization Survey) and consequences (incontinent episodes) were computed. All scores revealed normal distributions before and after intervention except for persuasive and overall research utilization scores after intervention. Persuasive research utilization scores were positively skewed, whereas overall research utilization scores were negatively skewed.

The percent mean scores for nurses' adoption rates and incontinent episodes were derived from five time points before and after intervention for each of the 29 medical records of patients with acute stroke and incontinence. The total percent mean score was determined for the descriptive statistics, but the five data

**TABLE 1. Demographic Characteristics of the Nurse Study Sample (*N* = 33)**

| Variable | Characteristic | *n* (%) |
|---|---|---|
| Gender | Female | 31 (93.9) |
| | Male | 2 (6.1) |
| Basic nursing education | Associate degree | 14 (42.4) |
| | Diploma | 4 (12.1) |
| | Baccalaureate degree | 15 (45.5) |
| Highest completed level of formal nursing education | Associate degree | 13 (39.4) |
| | Diploma | 3 (9.1) |
| | Baccalaureate degree | 17 (51.5) |
| Age, years | Mean (*SD*) | 33.79 (11.60) |
| | Range | 22–57 |
| Years worked as a nurse | Mean (*SD*) | 8.79 (10.51) |
| | Range | 0.5–37 |
| Years worked at study hospital | Mean (*SD*) | 5.49 (5.70) |
| | Range | 0.2–22 |

points were also used separately in the time-series data analyses.

In addition to percent mean scores, process indicators of each behavior from the chart review form were explored (Table 3). Preintervention process indicators 1, 2, 3, 8, 10, 12, 14, and 15 had a mean of 0%. The mean for postintervention process indicators 8 and 14 remained at 0%. Process indicators 4, 6, 9, and 11 were normally distributed before and after intervention. Process indicators 10 and 13 were normally distributed after intervention with process indicator 13 being positively skewed before intervention. Process indicators 1 and 5 were normally distributed before intervention and positively skewed after intervention. Process indicators 2 and 3 were positively skewed after intervention, whereas process indicator 7 was positively skewed before and after intervention. Finally, process indicators 12 and 15 were negatively skewed after intervention.

Time-series models for adoption rates and incontinence episodes were developed to examine the effect

**TABLE 2. Preintervention and Postintervention Descriptive Data of Theoretical Variables**

| Variable | Mean (*SD*) | Min, Max | Std Error of Skewness | Std Error of Kurtosis |
|---|---|---|---|---|
| Preintervention | | | | |
| Adoption rates | 18.08 (3.36) | 13.18, 22.24 | .91 | 2.00 |
| Incontinence episodes | 65.92 (36.39) | 6.60, 100 | .91 | 2.00 |
| Overall RU | 4.63 (1.71) | 3, 7 | .52 | 1.01 |
| Direct RU | 3.85 (1.95) | 1, 7 | .51 | 0.99 |
| Indirect RU | 4.89 (1.56) | 3, 7 | .52 | 1.01 |
| Persuasive RU | 3.18 (1.63) | 1, 6 | .55 | 1.06 |
| Attitudes toward research | 25.63 (2.59) | 18, 30 | .52 | 1.01 |
| Postintervention | | | | |
| Adoption rates | 33.40 (7.10) | 20.42, 46.30 | .46 | 0.89 |
| Incontinence episodes | 63.82 (23.80) | 20, 100 | .46 | 0.89 |
| Overall RU | 5.00 (2.13) | 1, 7 | .51 | 0.99 |
| Direct RU | 4.25 (1.83) | 1, 8 | .51 | 0.99 |
| Indirect RU | 5.60 (1.73) | 3, 8 | .51 | 0.99 |
| Persuasive RU | 3.68 (2.03) | 1, 8 | .52 | 1.01 |
| Attitudes toward research | 25.70 (2.39) | 19, 30 | .51 | 0.99 |

*Note.* RU = research utilization; Min = minimum score; Max = maximum score; Std = standard.

**TABLE 3.** Preintervention and Postintervention Descriptive Data for Documented Adoption Behaviors Scores ($N$ = 33)

| Variable | Preintervention Mean Percent (*SD*) | Postintervention Mean Percent (*SD*) |
|---|---|---|
| 1. History of incontinence | 0 (0) | 17.6 (37.4) |
| 2. Percent cognitive awareness* | 0 (0) | 20.4 (30.7) |
| 3. Patient's motivation to be continent | 0 (0) | 17.7 (35) |
| 4. Percent source of fluid intake | 91.9 (8.5) | 82.8 (14) |
| 5. Date and time of last bowel movement* | 8 (11) | 17.7 (17.3) |
| 6. Medical/surgical history | 99.2 (0) | 99.2 (0) |
| 7. Medications that would increase urinary frequency | 8 (17.9) | 26.2 (37) |
| 8. Medications that would decrease urinary frequency | 0 (0) | 0 (0) |
| 9. Percent functional ability | 53 (14.4) | 79.2 (17.3) |
| 10. Environmental barriers | 0 (0) | 36.2 (40.8) |
| 11. Date of last urinalysis* | 12 (11) | 10.8 (10.2) |
| 12. Two-day voiding record | 0 (0) | 92.7 (16.8) |
| 13. Intervention for constipation* | 4 (8.9) | 45.4 (38.6) |
| 14. Encouragement of decaffeinated products | 0 (0) | 0 (0) |
| 15. Scheduled prompted voiding times* | 0 (0) | 84.2 (28.2) |

*$p < .05$, one-tailed test.

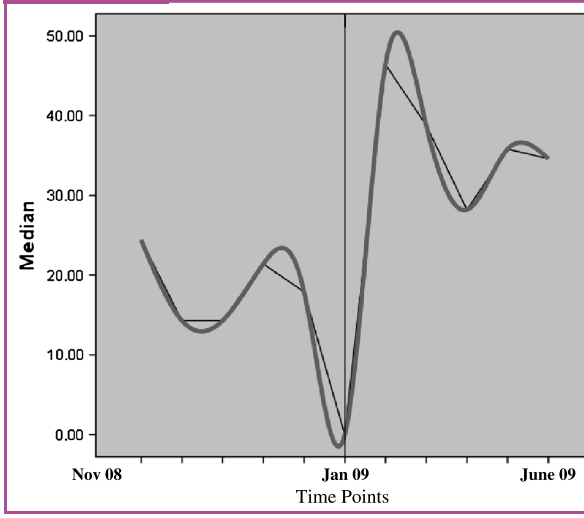
of the intervention. The selected design was five time points for each of the 29 medical records during the eight 1-week preintervention phase and five time points for each of the 29 medical records during the 16 one-week postintervention phase. The design was necessitated by use of correlated longitudinal data, nurses' schedules, and LOS of patients with stroke. Patients' preintervention mean LOS was 4 days, and postintervention mean LOS was 5 days. Data were collected over an extended period, and an intervention was introduced during the time period to meet time-series requirements. An autoregressive integrated moving average, (0, 1, 1) interrupted time-series model without transformation was used to examine the step effect of the intervention on nurses' adoption rates and the rate of incontinence episodes.

The mean adoption rate before intervention was 18.1%, and the mean adoption rate after intervention was 33.4%. The nearly two-fold increase in the adoption rate suggested that the impact of the intervention was a 15.3% increase in the mean adoption rate after intervention (Figure 2).

In addition, the impact of the intervention was a 2.1% reduction in the mean rate of incontinence episodes after intervention. These results indicated that the intervention was not as effective in the reduction of the rate of incontinence for the patients as it was for the increased adoption rate of the nurses.

Paired-samples $t$ tests were employed to assess the statistical significance of the nurses' research utilization and research attitude score differences from preintervention and postintervention time points ($n$ = 20). Indirect research utilization was the only set of scores that was statistically significant. The results for the paired-samples $t$ tests were corroborated with exact tests using StatXact 8 (2008). Results of the StatXact 8 tests were the same as the asymptotic $t$ tests; therefore,

**FIGURE 2** A Simple Line Graph Showing the Median Values for Nurses' Adoption Rate With Time Points Before and After Intervention



only the results of the asymptotic *t* tests are reported. G*Power was used to perform the post hoc power analyses for all of the *t* test results (Erdfelder et al., 1996).

The paired-samples *t* test was conducted to evaluate the impact of the intervention on nurses' indirect research utilization scores. There was a statistically significant increase of indirect research utilization from time 1 ($M = 4.89$, $SD = 1.56$) to time 2 ($M = 5.74$, $SD = 1.66$), $t$ (−3.024) = .00 (one-tailed). The mean increase of indirect research utilization scores was −.84 with 95% confidence interval ranging from −1.43 to −.26. Post hoc analysis of $d = .70$ indicated a medium-to-large effect size (Cohen, 1988). On the basis of the difference between the paired means and standard deviations of the preintervention and postintervention rates, $n = 19$ provided a 90% power.

Survey question 10 measured indirect research utilization and was defined as the use of research findings (nursing and non-nursing) that changed nurses' opinions about how to approach certain patient care situations. Positive statistical significance of indirect research utilization subscale might represent nurses' responses to being exposed to the use of the evidence-based bladder protocol.

A standard multiple regression was conducted to evaluate the relationships among the adoption rate, nurse demographic characteristics, and nurses' research attitude scores. The DV, adoption rate, was regressed onto the IVs of age, basic nursing education, highest completed level of formal nursing education, years worked as a nurse, years worked at this hospital, and nurses' research attitude scores.

The linear combination of the IVs was not overall significantly related to adoption rate. Because there were significant correlations (Table 4), the decision was made to explore other models for relationships among the variables. Education and highest degree earned were highly correlated. Given that education was correlated with adoption rate, education was chosen to represent this characteristic in the final regression model.

The demographic variables were added to block 1 of the regression model, whereas nurses' research attitude scores were added to block 2. The SPSS was set to select the most statistically significant variables within each block. Education was significant ($b = 2.06$, $SE = .98$, $t = 2.10$, $p = .03$) after controlling for the influence of research attitudes, which appeared to function as a suppresser variable in this model, $r^2 = .20$, $F(1, 15) = 3.69$, $p = .04$ (one-tailed). The medical record sample size, $n = 29$, was needed to achieve the desired power of 80%. The multiple regression results were corroborated with exact tests using LogXact 8 (2008). Results of the LogXact *p* values were the same as the asymptotic *p* values.

The nurses who participated in the survey were asked their opinion about the effectiveness of the bladder protocol. Additional descriptive statistics were performed to answer the investigator-developed question for the postintervention time point (Table 5). The question, "Was the evidence-based bladder protocol effective in the management of the incontinent stroke patient?" used "very effective," "somewhat effective," "slightly effective," and "not effective" as responses without numeric values assigned.

## Implications for Practice

Nurses who provide care to patients with stroke want to deliver optimal care for the best outcomes. Using evidence to support practice is presently becoming more supported; therefore, it is more feasible for nurses to integrate the use of research into practice. The best available evidence-based bladder protocol identified for this study was a prompted voiding algorithm (Registered Nurses' Association of Ontario, 2005). The protocol was used because it provided a level of evidence for each

**TABLE 4.** Estimated Pearson Correlations Between the Demographic Variables, Research Attitudes, and Nurses' Adoption Rates

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. Gender | — | .15 | −.09 | −.06 | .24 | .30 | −.33 | .08 |
| 2. Age | | — | −.51[a] | −.50[a] | .78[b] | .40[a] | −.39[a] | −.26 |
| 3. Education | | | — | .96[b] | −.02 | .29 | .29 | .44[a] |
| 4. Highest degree | | | | — | −.01 | .30 | .43[a] | .41 |
| 5. Nursing years | | | | | — | .64[b] | −.18 | −.23 |
| 6. Nursing at hospital | | | | | | — | −.12 | .12 |
| 7. Research attitudes | | | | | | | — | −.08 |
| 8. Adoption rate | | | | | | | | — |

[a]Correlation is significant at the .05 level (one tailed). [b]Correlation is significant at the .01 level (one tailed).

intervention and it was previously used with cognitively impaired patients. Strong support for prompted voiding demonstrated the reduction of urinary incontinence in patients with cognitive and physical deficits (Gross, 2003).

This study was the first to evaluate the influence of the combination of these four translation strategies and nurses' attitudes toward research on the adoption of evidence-based practice in a time-series design study. The time-series design was used because an experimental design was not feasible, but these findings can be pilot data for experimental research that is needed to provide the strongest evidence for practice change. In the review (Frasure, 2006) of the four strategies, there was no case when harm outweighed the risk when deciding to use one or more of the strategies. Hence, those pursuing practice improvements should consider using a combination of these four strategies when attempting to change nurses' behaviors. There is no harm in advocating for the use of the bladder protocol because there is minimal risk involved in using these strategies to adopt the evidence-based bladder protocol. The bladder protocol would be helpful to a unit where there is no protocol. The benefits of using a tested evidence-based protocol outweigh the benefits of writing and using a protocol that is not evidence based. The nursing unit in this study chose not to adopt the bladder protocol after the study completion. At the time of the study, the use of evidence-based practice was not a priority of the study site's institution.

The RNAO allows nurses to adapt the educational materials (prompted voiding algorithm) to fit the needs of the patient setting. As suggested in Greenhalgh, Robert, Macfarlane, Bate, and Kyriakidou (2004), the researcher could facilitate the unit manager or a unit change champion in working with the nurses to identify the most important prompted voiding criteria to be used on their unit and provide consultation for educational meetings (individual or group workshops). Education might be targeted at the behaviors that are critical to the success of the bladder protocol and should be used exclusively to see if adoption rates increase. The audit (chart review form) could be modified to fit the needs of the unit for audit and feedback to be given at scheduled intervals. Feedback (e-mail messages and bulletin board updates) could also serve as staff reminders about the new protocol. Encouraging stakeholders' participation in the practice change can enhance adoption of the innovation (Rogers, 2003). The nurse manager or the unit change champion could promote participation using a unit-designed reward system and celebrations to raise the excitement and the awareness of the practice changes.

**TABLE 5.** Effectiveness of the Evidence-Based Bladder Protocol ($n$ = 20)

| Variable | Frequency | % |
|---|---|---|
| Somewhat effective | 16 | 80 |
| Slightly effective | 1 | 5 |
| Missing | 3 | 15 |
| Total | 20 | 100 |

The finding that the rate of incontinence episodes did not significantly decrease was unanticipated but understandable after analyzing the nurses' adoption behaviors. Theory supports that consequences (continence episodes), whether negative or positive, needed to be monitored and reported to the adopters to guide the decision to adopt or reject the innovation. Positive consequences served as motivators for the adopters, whereas transparency in reporting negative consequences enhanced trust (Rogers, 2003). Most of the adoption behaviors did not improve significantly, and the consequences demonstrated the influence of the implementation process on patient outcomes. Measures of consequences (continence episodes) were evaluated for change after the intervention, but there was no significant change in incontinence episodes.

This finding from this study is not consistent with prior research and theory. The use of the intervention of the combined use of educational materials, educational meetings, reminders, and audit and feedback in studies with diverse patient populations has been shown to be effective in improving patient outcomes. Only two studies were located that used the combined use of the same four translation strategies (Abbott, Dremsa, Stewart, Mark, & Swift, 2006; Berenholtz et al., 2004). Unlike the current study, findings from both of these previous studies support Greenhalgh et al. demonstrating that patient outcomes can significantly improve with the appropriate implementation process.

Because nurses' adoption of the evidence-based bladder protocol influences urinary continence, it is imperative to understand the inconsistencies in nurses' adoption rates. Involving and updating the nurses who are making the practice change might increase the desire to increase adoption behaviors. Just as communication is important to nurses, an additional implication for practice might be to add a more structured effort to strengthen nurse–patient communication to increase the intervention's impact on the rate of urinary incontinence (McDonald, Pezzin, Feldman, Murtaugh, & Peng, 2005). The patients with stroke in this study who were able to participate in their care were more successful with prompted voiding than patients who had difficulty with communication. Another possible way to get patients involved with the bladder protocol and to be more efficient with the LOS would be the

use of patient diaries. Patients who are cognitively aware of the bladder protocol could record times of incontinent and continent episodes in their diaries (RNAO, 2005).

The level of nursing education was found to possibly influence adoption of evidence-based practice; therefore, a research mentor or champion could be invaluable to providing education about evidence-based practice to staff nurses. The lower mean age of the nurses indicates that they have not been a nurse as long as some of their older peers. Practice changes might be easier to incorporate into patient care if nurses are not as entrenched in traditional care routines. Novice nurses might be provided a foundation for practice if evidence-based practice is taught to the nurses as the goal of care.

The role of a research champion was not part of this study's intervention, but the influence of the researcher as a boundary spanner was present. Boundary spanners are people who have strong ties both inside and outside of an organization who are willing to link the organization to the outside relevant to the innovation (Greenhalgh et al., 2004; Greenhalgh, Robert, Bate, Macfarlane, & Kyriakidou, 2005). Formalizing relationships between academic and clinical sites can benefit both researchers and nurses employed by hospitals. When studying research facilitators and agencies, Melnyk et al. (2004) found nursing faculty and schools of nursing to rank highest when they helped nurses integrate research evidence into practice. Many academic healthcare institutions have already designed research and practice models (Larrabee, 2009). Successful programs could be research and practice models for other interested institutions.

### Implications for Nursing Research

Remaining gaps in knowledge still exist about the combined use of the four translation strategies of educational materials, educational meetings, reminders, and audit and feedback in the adoption of an innovation. The concept of sustainability was not studied because of time constraints, but that was an area of concern. It was difficult enough to maintain nurses' interests for 16 weeks, so permanent change would be even more of a challenge. Further studies are needed to identify strategies that promote permanent and sustained practice changes.

First, more research, especially intervention studies, is still needed on specific translation strategies that are known to promote the adoption of research in practice (Melnyk et al., 2004). This study should be replicated with the intervention phase being longer and more robust than the present intervention. Possible ways to make the intervention more robust would be a more aggressive approach to announcements and updates relevant to the study and possibly giving the nurses easy access to the printed or electronic protocol (Larrabee, 2009) or laminated pocket cards. The study should be replicated with patients with stroke in other settings, such as rehabilitation, or in other patient populations with urinary incontinence problems. Study replication should also be conducted with a different patient population using the same intervention but replacing the CPG with one that is appropriate for the needs of the different patient population.

Second, the LOS in the acute care setting may not allow for the time needed to be successful with the prompted voiding algorithm. Research is needed to examine if acute care settings and rehabilitation settings might partner in the use of an evidence-based bladder protocol. Many acute care and rehabilitation settings have existing relationships; hence, the continuity of care should be feasible. The combination of the acute care LOS and the rehabilitation LOS should be sufficient time to determine the exact number of days that are needed for the prompted voiding algorithm to be successful.

Third, significant patient outcomes are vital to the adoption of research into practice. Research has demonstrated that identifying a patients individualized voiding patterns is important to the prompted voiding schedule (RNAO, 2005). The voiding record data need to be more accurate and less burdensome for nurses and patient care assistants to collect to promote compliance. Moisture sensors in incontinence pads or in patients' beds are available technologically, but there is a need for research and development relevant to incontinence care. Collaboration with multidisciplinary researchers and corporations is needed to use moisture sensor technology to promote the improvement of patient outcomes.

## Summary

The primary purpose of the study was to examine the effects of an intervention consisting of the four translation strategies of educational materials (CPG), educational meetings, reminders, and audit and feedback on nurses' adoption of an evidence-based bladder protocol for patients with stroke in an acute care setting. The second purpose was to evaluate the difference in incontinence episodes of patients with stroke before and after nurses received the intervention. The third purpose of the study was to evaluate the influence of nurses' attitudes and demographic characteristics on the adoption and use of the evidence-based bladder protocol after receiving the intervention. Data supported a two-fold increase in the nurses' adoption of an evidence-based bladder protocol, but there was no statistical difference in the incontinence episodes before and after intervention. Nurses' level of basic nursing education had an influence on the adoption and use of the evidence-based bladder protocol.

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