



Original Article

The Relationship Among Evidence-Based Practice and Client Dyspnea, Pain, Falls, and Pressure Ulcer Outcomes in the Community Setting

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ABSTRACT

Background: There are gaps in knowledge about the extent to which home care nurses' practice is based on best evidence and whether evidence-based practice impacts patient outcomes.

Aim: The purpose of this study was to investigate the relationship between evidence-based practice and client pain, dyspnea, falls, and pressure ulcer outcomes in the home care setting. Evidence-based practice was defined as nursing interventions based on best practice guidelines.

Methods: The Nursing Role Effectiveness model was used to guide the selection of variables for investigation. Data were collected from administrative records on percent of visits made by Registered Nurses (RN), total number of nursing visits, and consistency of visits by principal nurse. Charts audits were used to collect data on nursing interventions and client outcomes. The sample consisted of 338 nurses from 13 home care offices and 939 de-identified client charts. Hierarchical generalized linear regression approaches were constructed to explore which variables explain variation in client outcomes.

Results: The study found documentation of nursing interventions based on best practice guidelines was positively associated with improvement in dyspnea, pain, falls, and pressure ulcer outcomes. Percent of visits made by an RN and consistency of visits by a principal nurse were not found to be associated with improved client outcomes, but the total number of nursing visits was.

Linking Evidence to Action: Implementation of best practice is associated with improved client outcomes in the home care setting. Future research needs to explore ways to more effectively foster the documentation of evidence-based practice interventions.

INTRODUCTION

Home care (HC) has been a critical part of healthcare restructuring and has played a key role in primary health care, chronic disease management, and aging-at-home strategies across Canada (Canadian Home Care Association, 2013). There has been a growing emphasis on chronic disease management as a result of demographic changes associated with an aging population, and consequently there is an increasing emphasis on care in the community, and an increased focus on evidence-based practice (EBP) as a means to improve the efficiency and effectiveness of healthcare delivery. However, there are gaps in knowledge about the extent to which HC nurses' practice is based on best evidence, and whether EBP has an effect on client outcomes in this setting.

The home has been described as an unpredictable environment for care because the healthcare provider visits each home

for relatively short periods (an average of 45 minutes) and only a few times per week (Madigan & Fortinsky, 1999). Furthermore, HC nurses have more autonomy in their practice than nurses in institutional settings because they work more independently in clients' homes. This context of increased autonomy for HC nurses poses unique challenges for EBP because HC nurses work independently within the context of loosely structured teams, and the care that is provided is shared between formal and informal caregivers, as are the outcomes of the care.

STUDY PURPOSE

The purpose of this study was to investigate the relationship among EBP and client pain, dyspnea, falls, and pressure ulcer outcomes in the HC setting. EBP was defined as nursing interventions based on best practice guidelines.

BACKGROUND

Current demographic changes in Canada suggest that the utilization of HC services will escalate significantly over the next 2 decades. HC programs across Canada have already experienced a 51% increase in the number of recipients since 2008 (Canadian Home Care Association, 2013). The Canadian Home Care Association (2013) estimates that 1.8 million Canadians receive publicly funded HC services annually at an estimated cost of \$5.8 billion.

The Canadian Home Care Association (2013) defines HC as an array of services for people of all ages, provided in the home and community setting, that encompasses health promotion and teaching, curative intervention, end-of-life care, rehabilitation, support and maintenance, social adaptation and integration and support for the informal (family) caregiver.

Despite the growing importance of HC, there is very limited research (EBP) and client outcomes in this setting. Bowers (2009) described a single patient case study of the role of a community nursing team in coordinating services and delivering evidence-based wound care. Impacts on outcomes were observed with regard to improved healing and return to former level of quality of life. Four evaluation studies were identified that investigated outcomes of EBP in a community setting. Prentice et al. (2009) examined the impact of introducing best practice guidelines for the assessment and management of diabetic foot ulcers. Evidence of outcomes was mixed. A significant reduction in the number of wounds and grade of wounds was noted; however, five new amputations among diabetic patients were reported. The study was limited in sample size, which could have influenced its internal validity. Locatelli et al. (2009) investigated the impact of European Best Practice Guideline (EBPG) computerized prompting on patient outcomes. This was a prospective, international, multicenter, cluster-randomized trial. Hematological targets for dialysis patients did not differ in the presence or absence of a computerized prompting system; however, there was a general shift toward improved patient distribution by hemoglobin categories where practice adhered to guideline recommendations. O'Connor, Creager, Mooney, Laizner, and Ritchie (2006) reported preliminary findings of a pilot implementation of evidence-based falls prevention interventions along with strategies to strengthen a culture of safety. Pre- and post-pilot surveys of organizational climate suggested that falls safety prevention is feasible although the impact on patient outcomes was not determined. Godley, Jones, Funk, Ives, and Passetti (2004) conducted a quasi-experimental study comparing outcomes of 274 adolescents who received best-practice outpatient treatment or cannabis youth treatment research-based interventions. The results suggested that neither the best-practice nor the research-based interventions were clearly superior.

These four studies offer equivocal evidence about the relationship between EBP and client outcomes in the community setting. With the exception of Locatelli et al. (2009), the research was limited with regard to study design, sample size, and efforts to account for confounding factors. Only one of the

studies was specific to HC. Our study was designed to address some of the limitations in this previous research by including a large sample of HC clients and collecting data on a broad range of client outcomes.

THEORETICAL PERSPECTIVE AND BACKGROUND LITERATURE

The Nursing Role Effectiveness Model (Irvine, Sidani, & McGillis Hall, 1998) provided the framework for investigating the relationship between EBP and client outcomes. The Nursing Role Effectiveness Model was developed to guide conceptualization and research related to nursing-sensitive outcomes and was based on Donabedian's (2005) theory about quality of care. The model depicts structural variables which influence nursing process, which in turn influence client outcomes. A brief description of the model follows.

There are two categories of structural variables of interest in this paper: nurse and patient. Nurse structural variables include factors such as experience level, knowledge, and skill level. Higher skill level, as measured by proportion of Registered Nurse (RN) hours, and baccalaureate education have been shown to be associated with the quality of nursing care (Doran et al., 2002; Doran, Sidani, Keatings, & Doidge, 2002) or improved patient outcomes (Doran et al., 2000; O'Brien-Pallas et al., 2002; McGillis Hall et al., 2003; Tourangeau et al., 2007). In this study, we focused on skill level of nurses providing care in the home, more specifically, whether care was provided by RNs or Registered Practical Nurses (RPNs). In Ontario, nursing is one profession with two categories: RN and RPN. The differences between the two categories are based on entry level and ongoing nursing knowledge and competencies. RNs are university graduates prepared at the baccalaureate level and RPNs are community college graduates. RNs study for a longer period of time relative to RPNs, allowing for greater depth and breadth of foundational knowledge in the areas of clinical practice, decision-making, critical thinking, leadership, and research utilization (Registered Practical Nurses Association of Ontario, 2013).

Patient characteristic variables, such as health status and morbidity, also can affect nursing care (Doran et al., 2006) and outcomes (Irvine et al., 2000; Doran et al. 2006; Tourangeau et al., 2007). The patient characteristic variables of interest in this study were client age, gender, medical diagnoses, and length on service and were primarily included as control variables because they reflect clients' potential for improved outcomes (Doran et al., 2006; Stevens, Ryan, & Kresnow, 2006; Doran et al., 2013). Nurses' role (i.e., nursing process) has three subcomponents: nurses' independent role, nurses' dependent role, and nurses' interdependent role. Independent role functions include assessment, diagnosis, nurse-initiated interventions, and follow-up care. EBP is an independent role function and has been associated with improved client outcomes in one community study (Bowers, 2009). The dependent role functions include execution of medical orders and physician-initiated treatments and were not examined in this

study. Interdependent role functions include communication, case management, coordination of care, and continuity or monitoring and reporting. In this study, we measured consistency of the principal nurse providing care in the home as a measure of continuity of care. Continuity of care has been associated with improved outcomes for patients with chronic diseases (Chu, Chen, & Cheng, 2012; McLachlan et al., 2012; Chen, Tseng, & Cheng, 2013). Total number of nursing visits was included as a control variable to account for how much nursing care the client received but no hypotheses were advanced for this variable. The patient health outcomes of the independent and interdependent roles are clinical or symptom control and freedom from complications. In this study, we focused on outcomes with demonstrated sensitivity to nursing care and for which there EBP guidelines—pain, dyspnea, falls, and pressure ulcer outcomes (Doran et al., 2006). The hypotheses derived from the Nursing Role Effectiveness Model are summarized below.

1. Proportion of visits made by an RN (structural variable) will be positively associated with improvement in client pain, dyspnea, falls, and pressure ulcer outcomes.
2. Total number of nursing interventions consistent with best-practice guidelines (process variable) will be positively associated with improvement in client pain, dyspnea, falls, and pressure ulcer outcomes.
3. Higher proportion of visits made by the principal nurse (process variable) will be positively associated with improvement in client pain, dyspnea, falls, and pressure ulcer outcomes.

METHODS

Study Design

A cross-sectional design was used to test the study hypotheses. Data on nursing interventions and client outcomes were collected through chart audit over a 9-month period. The study received research ethics approval through the university research ethics review board and each participating organizations' internal research ethics review process. Only secondary de-identified client data were obtained.

Setting and Sample

The setting was regional offices from four HC service providers in Ontario, Canada. HC service providers are for-profit or not-for-profit organizations that provide nursing, allied health (e.g., occupational therapy) and home-making services under contract through each province's publicly funded HC program. A purposeful stratified cluster sampling was used. Offices were selected to represent urban, suburban, and rural catchment areas. Eighteen offices were selected from 50 potential offices.

Clients (i.e., client charts) were eligible for inclusion if the client was aged 18 years or older, had received three or more

nursing visits during the episode of care, and if the client's outcomes had been documented as required by the organization on admission and on discharge. Charts were excluded if the client had surgery during the course of care, which could have affected the client's outcomes.

Data Collection Measures and Procedures

The study variables, approach to data collection, sample items, and reliabilities are summarized in Table 1 and as follows.

Structural variables. For each case included in the study, data were obtained on the client's age, gender, medical diagnoses, and total number of days of HC service at the time of HC discharge. These data were provided by each HC service organization and were obtained from their administrative databases. Nursing skill-mix was determined by the proportion of visits made by an RN for each client in the study. Skill-mix data were provided by organizations from their billing records.

Process variables. Total number of nurse visits was the sum of visits made by an RN and RPN. Consistency of nurse provider was determined by the proportion of visits made by the principal nurse (either RN or RPN) for client in the study. Total number of nurse visits and consistency of principal nurse were provided by organizations from their administrative databases.

Data were collected on evidence-based nursing interventions documented in the client records that were consistent with Registered Nurses of Ontario (RNAO) best practice guidelines through retrospective chart audits. Audits were conducted by nurses who were trained chart abstractors, using a tool developed by Doran (Doran et al., 2007). The chart audit tool consisted of a 79-item checklist of EBP interventions that were abstracted from published guidelines for pain, dyspnea, pressure ulcers, and falls (Registered Nurses' Association of Ontario, 2005a, 2005b, 2007). The checklist enables the recording of whether or not there was documentation to indicate that the intervention had been completed by any nurse during the episode of care. The total number of interventions consistent with best practice guideline recommendations represents the frequency of EBP. Inter-rater reliability was assessed by asking each auditor to audit the same four sample charts. A total of 106 items applicable to the four sample charts were used to determine agreement among auditors.

For a nominal response, kappa statistic was computed. For the ordinal response, Kendall's coefficient of concordance was computed. Among 106 variables being evaluated, 24.53% of them had a poor or slight agreement among raters (<.20); 5.66% of them had fair agreement (.21–.40); 4.72% of them had moderate agreement (.41–.60); 65% of variables had substantial or almost perfect agreement among raters (.61–1.00). Since only four charts were involved in the reliability evaluation, a small proportion of inconsistency or even one different rating among raters would lead to a very low Kappa's statistic or Kendall's coefficient of concordance. In conclusion, the reliability among raters is overall satisfactory based on the analysis of the available data.

Table 1. Variables and Questionnaires Used in the Study

Concept	Sample item	Response format or approach to data collection	Reliability
Structural variables			
Client characteristics (Collected from chart audit following client discharge from care)			
Client demographic, medical diagnosis, length on services	Age, diagnosis on admission, number of days on service	Collected from chart audits and organizational billing records	See information on inter-rater reliability below
Nurse structural variables			
Skill mix	Proportion of visits made by RN	Collected from organizational billing records	NA
Process variables (collected from organizational records after client discharge from care)			
Total number of nursing visits	Total number of nursing visits made by RNs* and RPNs**	Collected from organizational databases	NA
Consistency of nurse	Proportion of visits made by principal nurse	Collected from organizational billing records	NA
Evidence-based nursing interventions (79 items)	"Smoking cessation strategies instituted for patients who smoke"	Chart audit tool	See inter-rater reliability below
Client outcomes			
Health Outcomes for Better	Information and Care (HOBIC)	collected retrospectively from	organizational records after client discharge from care)
Pain frequency	No pain (0), present but not exhibited in the last 24 hours (1), to daily, multiple periods (3)	Audited from client records	NA
Dyspnea frequency	0 (absence of symptoms) to 3 (present at rest)	Audited from client records	NA
Falls	0 (no fall reported in the last 90 days) to 3 (two or more falls in the last 30 days)	Audited from client records	NA
Pressure ulcer	Staged from 0 (no pressure ulcer) to 5 (not codeable, e.g., necrotic eschar predominant)	Audited from client records	NA

Note: NA = not applicable; *RN = Registered Nurse; **RPN = Registered Practical Nurse.

Outcome variables. The outcome variables were client Health Outcomes for Better Information and Care (HOBIC) outcomes. We investigated four HOBIC outcomes because these could be matched to RAO BPGs; specifically, pain, dyspnea, pressure ulcers, and falls. HOBIC is an initiative funded by the Ontario Ministry of Health and Long-Care (MOHLTC) that focuses on the collection of patient outcomes sensitive to nursing care in acute care, long-term care, HC, and chronic care settings (Pringle & White, 2002; Pringle & Doran, 2003). HOBIC data are routinely collected at the point-of-care using valid and reliable scales when nurses complete patient assessments. Visiting nurses documented pain frequency, dyspnea, falls, and

pressure ulcer outcomes on admission and then again on discharge, or after 4 months, whichever came first. Pain frequency measure ranged from no pain (0), present but not exhibited in the last 24 hours (1), to exhibited in the last 24 hours (2). The dyspnea measure ranged from 0 (*absence of symptoms*) to 3 (*present at rest*). The falls measure ranged from 0 (*no fall reported in the last 90 days*), 1 (*no fall in last 30 days, but fell 31–90 days ago*), 2 (*one fall in last 30 days*), to 3 (*two or more falls in the last 30 days*). Pressure ulcers were staged from 0 (*no pressure ulcer*) to 5 (*necrotic eschar predominant*). HOBIC outcomes were collected retrospectively from organizational records after clients were discharged from care. Example items are provided in Table 1.

Data Analysis

The demographic characteristics of HC clients were summarized using descriptive analysis. The results were expressed as mean and standard deviation (*SD*) for continuous variables and count (percentage) for categorical variables. To determine whether client outcomes significantly changed from admission to discharge, *t*-tests were performed. If change was detected, then it was appropriate to examine relationships among structure, process, and outcome variables using regression analysis. The measurements were conducted on individual nurses nested within teams which were in turn nested within organizations. Therefore, hierarchical generalized linear regression approaches were constructed to explain this structure. The assumption of normality was tested using Q-Q plot. All hypothesis tests were performed at .05 significance level.

RESULTS

A total of 978 client chart audits were completed. Thirty-nine audits were excluded due to ineligibility leaving 939 audits in the final data set.

Structural Variables

Nurse structural variable. RNs made 57.2% of the visits to clients while RPNs made the balance of visits.

Client structural variables. The typical client was 64 years old (*SD* 18.4 years), female (53%) with 3.4 medical diagnoses (range 1–13). Clients received care for a median of 16 days (range 1–125 days, mean 25.3, *SD* 24.7). The most frequently reported primary diagnoses were: disorder of the skin or subcutaneous tissue (18%); neoplasms (16.4%); and injury or poisoning (13.3).

Process variables. The average number of nursing visits made to a client was 12 (*SD* = 14.44). The average consistency of nurse provider was 63.5%, range 19%–100%. The documented evidence-based nursing interventions are discussed below for each outcome variable.

Output-outcome variables. Before addressing the research hypotheses, means and paired *t*-tests were computed for each outcome variable in order to determine whether the outcomes changed from admission to discharge. The mean, standard deviation, and paired *t*-test results for the outcome variables are summarized in Table 2. The mean scores were significantly reduced from admission to discharge for each outcome. The paired *t*-test for the outcome score difference between admission and discharge indicated that the health status measured by dyspnea, pain frequency, falls, and pressure ulcer had dramatically improved.

The results for the Intra Class Correlation (ICC) and Design Effects (DEs) are summarized first before presenting the findings for the research hypotheses. The ICCs for four outcome variables indicated low correlations within clusters; however, two of DEs calculated based on an average cluster size of 72 were greater than 2 (Sorra & Dye, 2010). Therefore, a

hierarchical modeling approach was considered for regression analysis for outcomes on the client set. The results from the hierarchical regression analysis are summarized below for each outcome variable.

Dyspnea outcome. Of the 909 cases for which data on HO-BIC assessment about dyspnea were available on admission, 231 (25.4%) indicated that dyspnea was present on admission. Sixty-two (6.8%) cases included documentation of COPD. In 10% of the 859 cases where the dyspnea assessment was documented on both admission and discharge, dyspnea improved during the course of nursing care. In the remaining cases, it was either unchanged or became worse. Of the 20 evidence-based interventions for dyspnea that were included in the audit, 15 interventions were not documented in 90% of cases for which they were relevant.

A high number of total interventions was likely to decrease the risk of dyspnea on discharge. Client age was the only structural variable associated with dyspnea outcome ($p = .04$); old-aged clients were likely to have a high probability of dyspnea score reduction (see Table 3). The results from hierarchical generalized linear regression (shown in Table 3) indicated that the total number of dyspnea interventions was significantly associated with dyspnea score changes; score on admission – score on discharge ($p < .0001$).

Pain outcome. At the time of admission, there was documentation that 62.8% of clients were experiencing at least some pain. Pain frequency was assessed on admission and discharge in 878 of 912 cases. Pain frequency decreased (i.e., improved) in 44% of cases, and remained unchanged or worsened in the remainder of cases. Nurses documented screening and assessment practices more frequently (e.g., “screen all patients at least once a visit for pain” documented in 56.2% of pertinent cases) than interventions (e.g., “if taking opioids, anticipate and monitor for nausea and vomiting, constipation and drowsiness” documented 24.3% of pertinent cases).

Clients who experienced more total pain interventions had a higher probability of decreased pain frequency on discharge ($p < .0001$; see Table 3). Four other predictors had statistically significant effects on the pain frequency outcome as follows: older clients had a lower probability of decreased pain frequency ($p = .002$); total number of diagnoses ($p = .02$) and total number of days on service ($p = .0007$) had a negative influence on the probability of pain frequency reduction; and higher number of nursing visits were associated with a higher probability of decreased pain frequency on discharge ($p = .0004$).

Falls outcome. Of the 939 audits included in the analysis, 220 did not indicate whether or not there had been a fall during the episode of care. For the 719 charts where there was documentation of falls being assessed, 6.3% of charts indicated that there had been a fall during the episode of care.

Of 10 interventions described in the BPG, the most frequently documented EBP was “assess falls risk on admission,”

Table 2. Mean, Standard Deviation, and t-test Results for Outcome Variables

Outcome variable	Admission		Discharge		Mean difference** (SD)	t Value	p Value
	N*	Mean (SD)	N*	Mean (SD)			
Dyspnea	909	.32 (.70)	871	.21 (.57)	.11 (.02)	6.41	<.0001
Pain frequency	885	1.30 (1.19)	912	.57 (.92)	.73 (.04)	19.60	<.0001
Falls	914	.30 (1.01)	719	.09 (.49)	.21 (.04)	5.33	<.0001
Pressure ulcer	894	.17 (.55)	749	.10 (.45)	.07 (.02)	4.77	<.0001

Note: *Total number of valid (i.e., non-missing) observations used in calculating means; **Mean difference = mean at admission - mean at discharge.

Table 3. Estimates and Odds Ratios and Corresponding 95% Confidence Intervals along with p-Values for Each Outcome, from Hierarchical Random Effect Models

Client outcome	Predictor	Estimate (SD)	Odds ratio** (95% CI)	p Value
Dyspnea	Age	.01 (.01)	1.02 (1.00, 1.03)	.0413
	No. of intervention documented: Dyspnea	.32 (.05)	1.38 (1.25, 1.52)	<.0001
Pain frequency	Age	-.01 (.00)	.99 (.98, .99)	.0018
	No. of diagnoses	-.07 (.04)	.92 (.86, .99)	.0201
	Length of service	-.01 (.00)	.99 (.98, .99)	.0007
	No. of nursing visits	.03 (.01)	1.03 (1.01, 1.05)	.0004
	No. of intervention documented: pain	.28 (.04)	1.31 (1.21, 1.42)	<.0001
Fall	Age	.02 (.01)	1.02 (1.01, 1.04)	.0044
	No. of diagnoses	.14 (.05)	1.16 (1.05, 1.28)	.0046
	No. of intervention documented: falls	.55 (.12)	1.74 (1.37, 2.21)	<.0001
Pressure ulcer	% of visits by most frequent nurse	-.05 (.02)	.96 (.92, 1.00)	.0332
	No. of intervention documented: pressure ulcers	.37 (.04)	1.46 (1.35, 1.56)	<.0001

Note: * Outcome variables are treated as a binary: 1 when health status is improved and 0 otherwise; **Odds ratios of continuous variables are associated with one unit decrease.

which was documented in 61.8% of pertinent cases. The remaining interventions were never or rarely documented (less than 10% of pertinent cases) indicating that nurses sometimes document falls risk assessments but rarely document interventions that could reduce the risk of falls.

The falls outcome was associated at statistically significant levels with the total number of fall interventions ($p < .0001$). The more documented falls interventions that were provided, the higher the probability of fewer falls. Older age was associated with a higher probability of fall frequency reduction ($p = .004$). Clients who had more recorded diagnoses or comorbidities were likely to have a higher probability of decreased number of falls ($p = .005$).

Pressure ulcer outcome. In 20.3% of 925 cases, there was documentation that the client either had a pressure ulcer (any stage) at the time of admission assessment or was at risk of developing a pressure ulcer. Of the 743 cases for which pressure ulcer information was documented on both admission and on discharge, 89.8% (667) had no pressure ulcer documented on either admission or on discharge.

Of the 76 cases where a pressure ulcer was documented on admission, 42 improved, 27 stayed the same, and 7 deteriorated during the episode of care. The most frequently documented evidence-based interventions for pressure ulcers were "head-to-toe assessment," which was documented in 39% of pertinent cases, and "nutritional assessment on admission if

nutritional deficit is suspected" documented in 22% of pertinent cases.

Two factors had a statistically significant influence on client pressure ulcers. More total documented interventions provided dramatically reduced the probability of pressure ulcer occurrences ($p < .0001$). The consistency of visits had a negative, but close to nonsignificant association with the probability of risk reduction of pressure ulcers on discharge ($p = .03$).

DISCUSSION

We investigated the extent to which EBP based on RNAO's BPGs was associated with improved outcomes for HC clients. We expected implementation of best practices to positively influence outcomes for HC clients. In the discussion that follows, the study strength and limitations are addressed, and the key findings are discussed.

Study Strengths and Limitations

To the best of our knowledge, this is the first study to examine the relationship between EBP and client outcomes in the HC context. The frequency of use of EBPs was based on audits of nurses' clinical documentation. It is unknown if some interventions were completed but not documented, which would lead to under-reporting of EBP and threaten internal validity of the study. The use of chart audit data also is subject to other limitations. For example, missing records were not available for audit, and not all charts included complete data. The amount of missing data varied for each indicator and is reflected in the results for each of the four outcomes. The strengths of chart audits are unobtrusive, and enabled review of all documentation throughout a client's episode of care; thus yielding a rich source of data. Real-time observation of nurse and client interactions would have provided direct evidence of nursing interventions, but was not feasible in this HC context where multiple data collectors would have been required to accompany nurses on all client visits; and could have introduced a response bias if nurses altered their practice in response to being observed.

Discussion of Key Findings

The discussion begins by considering some of the key findings related to the structure, process, and outcomes in the Nursing Role Effectiveness Model. Finally implications for nursing practice and for HC provider organizations are considered.

Of the 20 evidence-based interventions for dyspnea that were included in the audit, 15 interventions were not documented in 90% of cases for which such interventions could have been relevant. Nine of the 14 EBPs for pain were never or rarely documented (i.e., in less than 10% of cases where pain was present). The same is true for falls. In this study, it is unknown whether the interventions were being completed but not documented, or if they were not implemented. The accuracy of nursing documentation has been studied in acute care settings. Paans et al. screened 341 records of hospitalized patients and found that 95% of records revealed a low score on the accuracy

scale (Paans, Sermeus, Nieweg, & Van Der Schans, 2010). In the HC literature, the introduction of a standardized record led to more informative, comprehensive, and knowledge-sensitive documentation (Tornval, Wahren, & Wilhelmsson, 2009). In the current study, documentation was more frequent for EBPs about assessing client health status and less frequent for nursing interventions. Previous research also has observed nurses are more likely to document patient assessments than nursing interventions (Johnson, Jeffries, & Langdon, 2010).

Relationship Among Structural Variables, EBP (Nursing Process), and Client Outcomes

For clients with COPD or dyspnea, there was strong evidence of a relationship between the process variables and the outcome of care. Clients who had COPD or dyspnea documented on admission, and who had more evidence-based interventions documented during their episode of care, had higher odds of reduced dyspnea than clients whose charts did not include documentation of any interventions. Dyspnea was more likely to improve for older aged clients than younger clients. In contrast, older clients were less likely to have improvement in pain outcome, as were clients with multiple medical diagnoses and those with greater days on service. We know from past literature that older patients' pain is often under-treated. For example, Zyczkowska and colleagues followed the outcomes of 193,158 HC and complex continuing care clients and found there was a consistent decline in the percentage of clients receiving analgesia consistent with the World Health Organization best-practice recommendations among those in the highest age groups (Zyczkowska, Szczerbinska, Jantzi, & Hirdes, 2007). In the current study, the total number of nursing visits and the total number of documented evidence-based interventions were positively associated with improvement in pain outcome. These findings underscore the role of nursing in managing pain among HC clients and the importance of basing care on best evidence.

Consistency of visits made by the principal nurse and proportion of RN visits were not found to be associated with improvement in HC clients' outcomes. Consistency of principal nurse was conceptualized as an interdependent role function and was used to operationalize the concept of continuity of care. There are at least two reasons why the hypothesized relationship with client outcomes was not observed in this study. First, it is possible that if an evidence-based plan of care is established, it is less important who provides the care as long as there is consistency with its implementation. Second, continuity of care has been conceptualized in a variety of ways in the literature. Jee and Cabana (2006) classified the continuity of care measures into five types: duration, density, dispersion, sequence, and subjective measures. The majority of previous researchers have used continuity of care indices, such as the usual provider of care index, which is similar to the approach taken in this study. Chen et al. (2013) used a continuity of care index in their research, which measured the degree to which patient visits were dispersed among different providers. Their continuity of care index score was based on the number of

different providers seen and the number of visits to each provider in each year during the study period. This may be an alternative measure for determining continuity of care in the HC context and should be explored in future research.

Implications for Practice and for Organizations

Gaps in documentation were observed in this study that resulted in missing data about EBP. Documentation by exception is inadequate for organizations to know if best practices are being implemented on a consistent basis. Opportunities for improving the quality of care will be more easily recognized when client charts include outcomes data reflecting change in a client's condition. Such information can be used to guide clinical decision making, encourage reflective practice, and promote EBP (Doran & Sidani, 2007; Doran, 2010).

Further Research

Gaps remain in our understanding about the relationship between EBP and client outcomes in HC. For example, organizational contextual factors, such as organizational culture and leadership, have been identified as facilitators of research utilization and EBP (Estabrooks, Midodzi, Cummings, & Wallin, 2007; Doran et al., 2012, 2013) and need to be explored in future research in the HC setting. Future research needs to incorporate methods that enable more accurate assessment of nursing interventions because not all interventions are documented, and thus relying on chart audits to collect such data will underrepresent the nature of EBP. Longitudinal and experimental studies will be helpful to increase our understanding about supports that can impact the documentation of interventions and outcomes, such as electronic documentation in home care. Access to electronic resources to support information use has been associated with reduced barriers to research utilization (Doran, 2010) and increased self-reported use of research in practice (Doran et al., 2013). Further investigation of the variables that accurately describe the context of HC nursing and their influence on EBP is recommended.



LINKING EVIDENCE TO ACTION

- Promote EBP through improvements in clinical documentation of nursing interventions.
- Explore ways to improve clinical documentation of nursing interventions in HC.
- Patient outcome measurement is essential to evaluate the impact of EBP.
- Standardized assessment tools support clinical documentation of patient outcomes.
- Further exploration of the variables that describe the context of HC nursing and their influence on EBP is recommended.

CONCLUSIONS

The results of study showed that documentation of nursing interventions based on best practice guidelines was associated with improvement in dyspnea, pain, fall, and pressure ulcer outcomes. Percent of visits made by an RN and consistency of visits made by the principal nurse were not found to be associated with improved client outcomes, but the total number of nursing visits was. Further research examining the relationship between the practice environment, EBP, and client outcomes in the HC setting is recommended. **WVN**

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