

Predictors of Nurses' Intentions to Administer As-Needed Opioid Analgesics for Pain Relief to Postoperative Orthopaedic Patients in the Acute Care Setting

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BACKGROUND: Patients undergoing orthopaedic surgery experience severe postoperative pain that is frequently undertreated. No study was found that examined the predictors of nurses' intentions to administer as needed (PRN) opioid analgesics for postoperative pain relief.

PURPOSE: The purpose of this study was to determine what constructs from the Integrated Behavioral Model (IBM) can predict nurses' intentions to administer PRN opioid analgesics for pain relief to hospitalized postoperative orthopaedic patients.

METHODS: A nonexperimental, cross-sectional quantitative format was used. The sample consisted of 800 nurses. Data collection was done by survey.

RESULTS: Path analysis revealed the significant predictors of nurses' intention to administer opioid analgesics to be self-efficacy ($\beta = 0.15$), normative beliefs ($\beta = 0.21$), and salience (importance) of the behavior ($\beta = 0.25$).

CONCLUSION: The study showed that the IBM constructs are useful for predicting intentions toward performance of a professional behavior. The inclusion of self-efficacy, underlying beliefs, and salience of the behavior was new and unique contributions to the existing body of knowledge.

Introduction

National hospital discharge data from the Centers of Disease Control and Prevention for 2010 identified operations on the musculoskeletal system as the fourth most common surgical procedure among patients who were discharged from a hospital in the United States (Centers for Disease Control and Prevention, 2014). Pain is a predictable outcome of musculoskeletal surgery and is frequently a reason for admission and readmission to the acute care setting (Coley, Williams, DaPos, Chen, & Smith, 2002; Ruiz-Suarez & Barber, 2008).

Nurses play an important role in the management of postoperative pain in hospitalized patients because they perform pain assessments on patients, administer pain

medications, and inform physicians when patients experience inadequate pain relief from prescribed medications. Nurses are also generally the first group of healthcare professionals that patients tell about their pain because of their 24 hours per day presence at the patient's bedside. Opioid analgesics are recognized as the drug of choice for treatment of severe acute postoperative pain (Agency for Health Care Policy and Research [AHCPR], Acute Pain Management Panel, 1992). Opioid analgesics are administered by nurses to postoperative orthopaedic patients while they are in the hospital for pain relief on an as needed basis (PRN) as per order and as a strategy to tailor pain relief to the patient's needs. Although nurses' administration of opioid analgesics plays a significant role in patient's pain treatment, little is known about nurses' intentions and the factors that affect their intentions to administer these PRN pain medications. Investigation into nurses' intentions to administer these medications is important to patient care and specifically postoperative orthopaedic patients because of the important role that intention plays in the performance of a behavior. According to Montano and Kasprzyk (2008), intention is similar to motivation, and it is unlikely that individuals will

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The authors and planners have disclosed no potential conflicts of interest, financial or otherwise.

DOI: 10.1097/NOR.0000000000000400

perform a behavior if they lack the motivation to perform the behavior. The purpose of this study was to examine the factors that play a role in nurses' intentions to administer opioid analgesics on an as needed basis for pain control to hospitalized postoperative orthopaedic patients.

POSTOPERATIVE PAIN CONTROL FOR HOSPITALIZED ORTHOPAEDIC PATIENTS

In spite of a wide variety of recommendations, and evidence-based guidelines directed at postoperative pain management, studies continue to show that postoperative pain (including postoperative orthopaedic pain) is inadequately managed both in the United States and internationally (Apfelbaum, Chen, Mehta, & Gan, 2003; Chung & Lui, 2003; Cordts, Grant, Brandt, & Mears, 2011; Gan, Habib, Miller, White, & Apfelbaum, 2014; Sommer et al., 2008). Sommer et al. (2008) found that 40% of hospitalized patients reported moderate or severe pain at rest on the day of surgery, and nearly 15% of patients were still experiencing moderate or severe pain on postoperative day 4. Wang, Zhan, Fransen, and Lin (2012) concluded that 45% of hospitalized orthopaedic patients reported moderate pain after surgery, whereas 41% reported severe pain. Pain was reported by 58% of patients on postoperative day 1 and 43% of patients on postoperative day 3 among total joint replacement patients while these patients were resting according to these authors. Similar levels of acute postoperative pain were reported by Wylde, Rooker, Halliday, and Blom (2011), who examined acute postoperative pain at rest in patients who had undergone total hip or knee replacement surgery for the first time. Forty-seven percent of the total hip replacement patients reported moderate to severe pain on postoperative day 1, with more than 20% still reporting moderate to severe pain on postoperative day 2 and 11% on postoperative day 3 (Wylde et al., 2011). According to these authors, 58% of the total knee replacement patients verbalized moderate to severe pain on postoperative day 1, and 43% verbalized severe pain on postoperative day 3 (Wylde et al., 2011). Ekstein and Weinbroum (2011) concluded that a greater number of orthopaedic surgical patients reported severe pain in the immediate postoperative period as compared with general surgery patients. These authors reported that 6.6% ($n = 123$) of the laparotomy patients reported severe pain in the immediate postoperative period, whereas 12.7% or 203 orthopaedic surgical patients reported severe pain in the same timeframe. The authors also reported that orthopaedic patients required more pain medication than what the practice guidelines of the institution stipulated. Although these studies provide much data about the incidence of postoperative pain, they did not offer much information on the impact of nursing's pain administration behaviors on the overall incidence of postoperative pain.

NURSES AND PRN ORDERS FOR PAIN MEDICATIONS

Effective management of acute pain that follows orthopaedic surgery is important for better clinical outcomes, avoiding clinical complications and improving patient overall quality of life (Apfelbaum et al., 2003; Büyükyılmaz & Aşti, 2010). It is a common and acceptable practice for

providers to prescribe more than one route for medication administration, as well as "range orders" and as needed dosing (PRN) of opioids to meet the expected variations in pain severity in the immediate postoperative period (Drew et al., 2014). Range orders or PRN orders also allow for flexibility in the amount of medication that nurses administer to patients to meet needs of individual patients (Drew et al., 2014; Gordon, Pellino, Higgins, Pasero, & Murphy-Ende, 2008). Flexibility in pain medication administration is perceived as a vital part of the care for patients who need pain medications (Pasero & McCaffery, 2007).

Range and PRN orders alter the traditional role/responsibility of nurses in the treatment of postoperative pain because it empowers nurses to select and administer (titrate) prescribed doses of opioid analgesics to patients based on assessment findings. The American Society for Pain Management Nursing and the American Pain Society have issued a consensus statement that supports nurses deciding on the appropriate dose of opioids to administer from a prescribed range of orders (Drew et al., 2014). This nationally endorsed nursing role associated with range and PRN orders enables nurses to address patient pain using opioid analgesics.

Although it is clear that nurses play an important role in postoperative pain control and that the administration of pain medications is central to postoperative pain control, little is known about the factors that play a role in nurses' pain administration behaviors. Previous research has examined factors such as nurses' pain management knowledge, nurses' attitudes toward pain management, nurses' level of education and years of nursing practice, and the impact that these factors had on nurses' pain management behaviors. This study addressed a gap in the research and sought to add to the body of knowledge by looking at factors that may impact nurses' decisions to administer pain medications. More specifically the study examined the role that selected factors have on nurses' intentions to administer PRN pain medications.

THEORETICAL FRAMEWORK

The Integrated Behavioral Model (IBM) that originated from the Theory of Reasoned Action, Theory of Planned Behavior and other theories (Fishbein & Capella, 2006), was used as the conceptual framework, which guided the study. Like the Theory of Planned Behavior and the Theory of Reasoned Action, the IBM states that a person's intention toward a behavior is the strongest predictor of future behavior (Montano & Kasprzyk, 2008). This model further proposes that intention is a result of three types of beliefs (i.e., attitude, perceived norm, and personal agency). The model acknowledges that an individual needs the knowledge and skills to perform a behavior, the behavior must be important to the individual (salient), there must be few or no environmental constraints, and the behavior must be habitual in order for the behavior to occur. This model has been used to guide research designed to understand individual intentions toward certain behaviors. In this study, we use the model to examine the professional behavior of administration of PRN pain medications.

Administration of opioids is a behavior that nurses who care for postoperative orthopaedic patients perform frequently. This theory was suitable for this research because administration of opioid analgesics is a nursing action or intervention (behavior) that can be affected by (nurses) attitudes, their perceived norm, and personal agency (which encompasses their perceived control over performance of the behavior and their self-efficacy). The present study examined whether nurses' attitudes, perceived norm, personal agency, knowledge, salience of the behavior, and, what if any, environmental constraints had any impact on their intentions to administer PRN opioid analgesics to postoperative hospitalized orthopaedic patients.

STATEMENT OF THE PURPOSE

The purpose of this study was to determine how the selected constructs from the IBM are associated with nurses' intentions to administer PRN opioid analgesics for pain relief to postoperative orthopaedic patients. Corresponding with the stated purposes, two research questions were derived:

1. What are the descriptive statistics of nurses' demographic characteristics (age, level of education, gender, race/ethnicity, academic preparation, employer type, employment location, years of nursing practice, and number of years caring for postoperative orthopaedic patients)?
2. What is the path model to predict nurses' intention to administer opioid analgesics to postoperative orthopaedic patients when carrying out a prescribed PRN order?

Methods

Participants who were members of the National Association of Orthopedic Nurses (NAON) were recruited for this study. Simple random sampling was used to select the sample from the membership. Nurses from this organization were recruited because the organization is dedicated to the advancement of orthopaedic nursing and nurses in this organization regularly provide care to postoperative orthopaedic patients. The NAON had a membership of almost 6000 in 2014 (National Association of Orthopedic Nurses, 2015). The members consist of registered and licensed practical or licensed vocational nurses, student nurses, and others. A postcard notification was sent to the participants informing them of their inclusion in the study 2 weeks before the survey was mailed.

The research instrument used in this study was a four-page self-administered questionnaire. Two questionnaires were adopted and modified for this study: The Nursing Self-Efficacy Scale (Welsh, 2012) and the Pain Management Survey (Nash et al., 1996). Permission was obtained from both authors prior to using the instruments. The two questionnaires were merged to form one continuous questionnaire. The questionnaire as used in this study had a total of 57 items, 17 of which collected demographic information about participants. Pilot testing was done on the instrument to reestablish reliability and stability after it was modified and prior to its use in the study.

The questionnaire was divided into four separate sections. Section 1 contained 21 questions that collected information that measured participants' underlying beliefs about patients pain, their instrumental attitudes (or their beliefs about outcomes of a behavior), their normative beliefs (beliefs about expectations from important others about whether or not they should perform a behavior), perceived control (the extent to which they think they have control over performance of the behavior), intention to administer PRN opioids, and importance or salience of the behavior as well as a set of 11 elicitation questions regarding factors that affect postoperative pain management. Section 2 of the survey contained 11 questions and measured participants' knowledge regarding pain. Section 3 of the survey measured nurses' self-efficacy using 8 questions. The final section of the questionnaire collected participants' demographic information.

Approval was obtained from the Biomedical Institutional Review Board of the University of Toledo prior to the start of the study. A nonexperimental, cross-sectional, quantitative, anonymous survey was used to conduct this study and answer the research questions. An a priori power analysis was conducted to determine the necessary sample size using G*Power 3.0 (Faul, Erdfelder, Lang, & Buchner, 2007). With the α level set at 0.05, and the effect size at 0.20 (small), a two-tailed test and a power of 0.80, and using multiple linear regression as the statistical method, the minimum sample size was calculated to be 362. Data collection was done through two-wave mailing using a properly designed and pilot-tested instrument. A stamped self-addressed envelope was included in the first mailing, whereas the second mailing was conducted by e-mail. In the second mailing, participants were reminded to complete the survey and return if they had not done so already. An electronic copy of the survey was attached with the second mailing.

A total of 800 surveys were sent out to the target population, and 420 surveys were completed and returned, providing a response rate of 54% (420/775). There were 25 surveys that were not completed: 18 were undeliverable and 7 were returned uncompleted. Six surveys were removed prior to data analysis because they were not RNs, there was a conflict in responses or extreme outliers, and another 10 were removed because these respondents did not work in the acute care setting. Therefore, data from 404 surveys were used in the analysis.

Data were cleaned and then analyzed using SPSS Version 21 (IBM Corp., Armonk, NY) and EQS Version 6.1 (Multivariate Software, Inc., Temple City, CA) to answer the research questions. Outliers with extreme values were reviewed and verified with the original surveys received from the participants.

Reliability and validity of the instrument were examined prior to further data analysis. A principal component analysis was conducted to verify the construct validity of the instrument. Pedhazur and Schmelkin (1991) suggest that only the items with factor loadings exceeding 0.40 are meaningful in applications of factor analysis. In this study, items were retained only if the factor loading was above 0.50. In addition, only components with Eigen values greater than 1.00 were retained for interpretation. Path analysis using *maximum likelihood*

estimation was also conducted to answer research questions 2 and 3 by examining the comparative strength of direct and indirect relationships between the variables. The Type I error of all statistical tests was set at the level of 0.05.

During principal component analysis, self-efficacy and intention were identified as single constructs whereas nurses' underlying belief about patients' pain (Items 1–15) was found to have five factors. Nurses' behavioral belief (Item 16) was found to have three factors, nurses' normative belief (Item 17) was found to have two factors, and the elicitation item (Item 21) was found to have three factors. The factors were labeled as follows to reflect the content area that was addressed by these items:

- Underlying beliefs:
 1. Nurses' perceptions/beliefs about their patient's expression about their needs for pain medications
 2. Nurses' perceptions/beliefs about pain assessment by sign/symptom/medical condition
 3. Nurses' perceptions/beliefs about demographic influences on the amount of pain experienced
 4. Nurses' perceptions/beliefs about their patient's pain endurance level
- Behavioral beliefs:
 1. Nurses' beliefs about their performance as it relates to the favorable activity and comfort outcomes of pain control
 2. Nurses' beliefs about their performance as it relates to the unfavorable outcomes of pain control
 3. Nurses' belief about their performance as it relates to the favorable patient and institutional outcomes of pain control
- Normative beliefs:
 1. The normative beliefs of nursing/healthcare professionals
 2. The normative beliefs of patients and the patient's family
- Elicitation–barriers: The three factors of this one item related to three separate areas that were seen as barriers to the administration of PRN opioids for pain relief and were labeled to reflect these barriers:
 1. Patient's pain-related barriers (as perceived by nurses)
 2. Nurses' patient care load
 3. Pain management difficulties (of nurses)

The IBM constructs and their factors and the influence that they had on nurses' intentions to administer PRN opioids to postoperative patients for pain relief have been discussed in more detail in the Results section of this article.

Results

Table 1 presents the demographic data. Of the 404 nurses, 371 were female. Participants had an age range of 20 to 60 years and more. The educational preparation for nurses in this sample ranged from diploma to doc-

toral degree, and their years in nursing ranged from 0 to more than 21 years. The largest proportion of the participants had more than 21 years of experience caring for postoperative orthopaedic patients. Most were employed on a full-time basis. The entire sample was employed in an acute care hospital that was an academic/teaching, a community, or a public hospital located in a rural, urban, or suburban setting. Orthopaedics was identified as the primary area of clinical expertise by 336 (83.2%) nurses. Most of the nurses in this sample never had orthopaedic surgery that required an overnight stay in the hospital. The majority of participants self-identified as Caucasian.

Mean scores were calculated for nurses for each section of the questionnaire during data analysis. The mean scores were as follows: Section 1 of the survey that dealt with nurses' underlying beliefs about pain was 52.08 ($N = 399$, maximum 68, minimum 33, $SD = 5.6$); for Section 2, which measured nurses' knowledge regarding pain, the mean score was 8.90 ($N = 394$, minimum 3, maximum 11, $SD = 1.2$). The mean score for Section 3 (nurses' self-efficacy) was 74.5 ($N = 402$, minimum 33, maximum 80, $SD = 6.61$).

PATH MODEL TO PREDICT NURSE'S INTENTION TO ADMINISTER OPIOID ANALGESICS TO POSTOPERATIVE ORTHOPAEDIC PATIENTS WHEN ORDERED PRN

There were three separate intention questions addressed. The first question, Intention 1, addressed nurses' intention to administer opioid analgesics prescribed on a PRN basis to postoperative patients with moderate to severe pain (overall intentions without timing or dosage stipulation). The second question, Intention 2, addressed nurses' intention to administer the maximum dose of PRN opioid analgesics when next caring for a postoperative patient with moderate to severe pain (intention to administer the maximum dose of PRN opioids). The third intention item, Intention 3, addressed nurses' intentions to administer the next dose of PRN opioid analgesic before the maximum time allowed by the prescription when next caring for a postoperative patient with moderate to severe pain (intention to administer PRN opioid when there is a time stipulation).

Path analysis suggested that normative beliefs of nurses/healthcare professionals, salience of the behavior, and self-efficacy to be direct predictors of Intention 1 (i.e., nurses' overall intentions to administer PRN opioids). The determinant with the largest effect was salience of the behavior ($\beta = 0.25$), followed by normative beliefs ($\beta = 0.21$) and self-efficacy ($\beta = 0.15$). Perceived control was found to be an indirect determinant of intention through self-efficacy (0.11). All path coefficients for each intention item were statistically significant ($p < 0.05$) (see Figure 1).

The determinant with the largest effect for Intention 2 (i.e., nurses' intention to administer the maximum dose of PRN opioid analgesic) was normative beliefs of nurses/healthcare professionals ($\beta = 0.19$), followed by salience ($\beta = 0.12$). Perceived control ($\beta = 0.29$) and self-efficacy ($\beta = 0.13$) were also found to be an indirect determinant of this intention item through salience (of the behavior) (see Figure 2).

TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS (N = 404)

Variable	n (%)
Gender	
Female	371 (92.3)
Male	31 (7.7)
Age	
20–29 years	38 (9.5)
30–39 years	61 (15.2)
40–49 years	84 (20.9)
50–59 years	149 (37.1)
≥60 years	70 (17.4)
Licensure	
RN	404 (100)
Education	
Diploma	23 (5.7)
Associate degree	77 (19.1)
Bachelor degree	225 (55.7)
Master	77 (19.1)
Doctoral	2 (0.5)
Years in nursing	
0–5 years	59 (14.6)
6–10 years	66 (16.3)
11–15 years	43 (10.6)
15–20 years	64 (15.8)
≥21 years	172 (42.6)
Years of experience caring for postoperative orthopaedic patients	
0–5 years	84 (20.8)
6–10 years	94 (23.3)
11–15 years	53 (13.1)
15–20 years	63 (15.6)
≥21 years	110 (27.2)
Employment	
Full time	332 (82.4)
Part time	71 (17.6)
Race	
White	347 (86.8)
Asian	29 (7.3)
African American	14 (3.5)
Two or more races	10 (2.5)
Ethnicity	
Latino	11 (2.9)
Non-Hispanic	320 (84.4)
Other	48 (12.7)
Employment setting	
Acute care hospital	404 (100)

(continues)

TABLE 1. (Continued)

Variable	n (%)
Hospital type	
Academic hospital	152 (38.5)
Community hospital	182 (46.1)
Public hospital	61 (15.4)
Practice location	
Rural	53 (13.5)
Urban	184 (46.8)
Suburban	156 (39.7)
What is your primary area of clinical expertise?	
Medical	13 (3.2)
Surgical	38 (9.4)
Critical care	7 (1.7)
Orthopaedics	336 (83.2)
Others	10 (2.5)
Have you ever had orthopaedic surgery and stayed in the hospital?	
Yes	76 (18.9)
No	326 (81.1)

Finally for, Intention 3 (i.e., nurses' intention to administer the next dose of PRN opioid before the maximum time allowed), the determinant with the largest effect was self-efficacy ($\beta = 0.12$), followed by salience ($\beta = 0.11$). Perceived control ($\beta = 0.29$) and normative beliefs of nurses/healthcare professionals ($\beta = 0.17$) were found to be indirect predictors for this item through self-efficacy (see Figure 3).

All path coefficients for each intention item were statistically significant ($p < .05$). Normative beliefs of nurses/healthcare professionals were found to be predictors of intention for the first and second intention items, but not for the third. Self-efficacy was a direct predictor of intention for the first and third intention items but not for the second. The null hypothesis of no path model reaching satisfactory model fit for this research question was therefore rejected.

Discussion

Nurses play a vital role in the pain management of postoperative hospitalized patients. The literature showed a gap in the utilization of modern theory to investigate

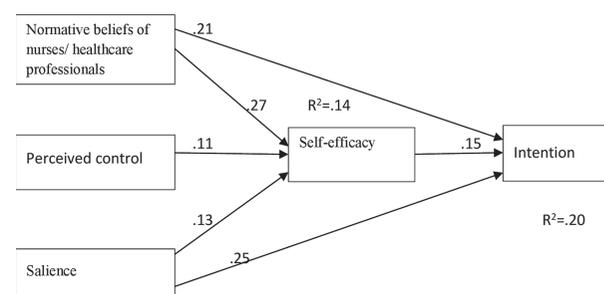


FIGURE 1. Path model for Intention 1.

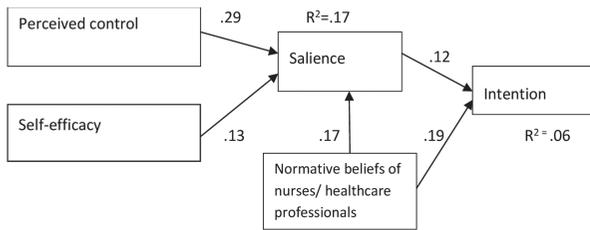


FIGURE 2. Path model for Intention 2.

the predictors of nurses' intention in pain management. This study aimed to bridge this gap using the IBM as the underlying theoretical framework. Prior studies have used the IBM constructs of self-efficacy, attitude, and perceived control to examine nurses' intention to administer narcotics or opioid pain medications. These studies did not exclusively examine pain management in orthopaedic patients, or among orthopaedic nurses. This study was necessary because it was guided by the constructs from the IBM theory and included salience of the behavior, knowledge, and self-efficacy as well as an elicitation question that inquired about nurses' perceived environmental and patient-related barriers to pain management.

Path analysis revealed normative beliefs of nurses/healthcare professionals, salience of the behavior, and self-efficacy to be direct predictors of nurses' overall intentions to administer PRN opioids (Intention 1). Normative beliefs of nurses/healthcare professionals' perceived control and salience also had an indirect influence on intentions through self-efficacy.

For Intention 2 (nurses' intention to administer the maximum dose of PRN opioids), path analysis revealed salience of the behavior and normative beliefs as the significant predictors of nurses' intentions. Perceived control, self-efficacy, and normative beliefs of nurses/healthcare providers had an indirect influence on intention for this item through salience of the behavior.

Finally, for Intention 3 (nurses' intentions to administer the next dose of PRN opioids before the maximum time allowed), salience and self-efficacy were the significant predictors for this item. Normative beliefs and perceived control had an indirect influence on intention through salience for this item.

Overall, path analysis revealed that salience of the behavior was the only variable that was a significant predictor for nurses' intentions to administer PRN opioids for all three intention items. It is worth mentioning that, although the combination of significant predictors for each intention item changed, the predictors themselves were the same for all items.

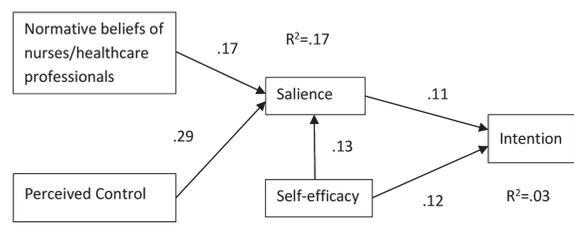


FIGURE 3. Path model for Intention 3.

Path analysis was conducted to investigate the direction and size of influence IBM construct has on nurses' intention for all three intention items. The IBM constructs that were significant predictors of nurses' intentions without dosage and timing stipulations were found to be self-efficacy, normative beliefs of nurses and healthcare professionals (the beliefs that nurses have about expectations from other nurses and healthcare professionals about whether or not they should perform a behavior) and salience of the behavior. In addition, perceived control and nurses' pain management difficulties (some of the perceived barriers to management of postoperative pain (see the Methods section) were found to be indirect predictors of intention through self-efficacy.

This study was unique in that it used the Integrated Behavior Model to investigate the impact of certain demographic and model constructs on nurses' intentions to administer PRN opioid analgesics for pain to postoperative orthopaedic patients. Path analysis found the IBM construct of self-efficacy to be a direct significant predictor of intention to administer PRN opioid analgesics. This finding reinforces the importance of self-efficacy when it comes to intentions toward the performance of a behavior, and is consistent with a major assumption of the IBM. Salience of the behavior, though not an IBM construct, was also found to be a direct predictor of the behavior that was examined. This finding is an important one because it supports another assumption of the IBM, namely that there are other important factors outside the main concepts identified by the theory (such as importance of the behavior) that also have an impact on the performance of a behavior.

Implications

This is the first study that was found that used the Integrated Behavior Model to examine nurses' intentions to administer PRN opioid analgesics for pain relief to postoperative orthopaedic patients in the acute care setting. Most often health behavior theories are used in voluntary behaviors that place one's health at risk such as exercising, weight loss, smoking cessation, and health screenings. This study shows that behavioral-based theories such as the IBM can be used to examine factors that have an impact on professional behaviors such as the administration of pain medications.

Findings from this study support the need for educational offerings for nurses about appropriate dosing and timing of PRN opioid analgesics. This need is supported by the frequency distribution of the answers that were given to the three intention items. The answers supplied showed the intentions of nurses to administer PRN opioid analgesics changing over the three intention items. The majority of participants (98%) indicated that they intended to give opioid analgesics when next caring for a postoperative patient. Only 77.6% of the nurses indicated that they intended to administer the maximum dose of PRN opioids, which was a 20% decrease between these two items. Only 32.4% of participants indicated that it was extremely likely that they would give the next dose of PRN opioid before the maximum time allowed. This represented a 45% decrease between the

intentions for the second and third items, and a 67% decrease between the intentions of the first and third items. These responses may be indicative of underlying concerns that nurses have regarding the administration of opioids with dosage and timing stipulations. Educational programs should aim to address these concerns and provide nurses with the training that they need to safely and confidently titrate PRN opioids.

Two previous studies were found that examined nurses' intentions to administer PRN opioid pain medications, but both studies used the Theory of Planned Behavior to guide their studies (Jurgens, 1996; Nash et al., 1996). This study examined the impact of perceived control, instrumental attitude, and normative beliefs on behavioral intentions and had findings similar to those found by Nash et al. (1996). The inclusion of the constructs of self-efficacy and nurses' underlying beliefs as well as salience (importance) on nurses' intentions to perform the behavior in the current study was new and unique and expands on the information that exists regarding the investigated factors.

Because behavioral beliefs differ across populations and even for different behaviors among the same individuals, it is important to conduct more studies using behavior-based theories since the administration of pain medications is an important behavior for patients, nurses, the patient's family/loved ones, physicians who treat these patients, the nursing unit, the organization, and society. This study also showed that a health behavior theory such as the Integrated Behavior Model can be used to predict intentions toward behaviors that are associated with professional roles such as administration of pain medication.

Limitations

This study had several limitations. The first limitation surrounds the validity and reliability of the research instrument. Validity for both the Pain Management Questionnaire and the Nurses' Self-efficacy Scale was established prior to their use in this study. Because the instruments were modified for the current study, face, content, and construct validity should have been formally done. Only informal validity for the modified instrument was established prior to its use in this study. Second, the α Cronbach for some of the items in the research instrument were below the 0.70 level. This has a bearing on the overall reliability of the instrument. This is especially important for the outcome variable, that of intention, whose α Cronbach was below 0.70. Therefore, an overall limitation of this study is that the instrument used was not reliable. This means that the findings may be different if the same instrument is used in the future.

The inclusion of only nurses who belonged to this professional organization may have resulted in significantly higher scores and overall mean scores on the items measured because the sample rationally has a higher awareness of the importance of pain management for postoperative orthopaedic patients. Participants also had to be actively employed as a registered nurse and currently providing care to postoperative orthopaedic patients, which are factors that could have resulted in higher overall scores for participants.

This might have been especially true for the self-efficacy scores, which were relatively high for these participants ($M = 74.5$, minimum 33, maximum 80). It is reasonable to expect that the nurses in this sample would have relatively high self-efficacy scores regarding their ability to care for patients with postoperative pain because of the frequency with which they are engaged in this activity.

The fact that data were collected using a self-administered questionnaire was also a limitation because participants in this study could have looked up the answers to some items while completing the questionnaire, so their answers may not have been a true reflection of their knowledge. Self-reporting also frequently results in participants providing answers that are perceived as socially acceptable instead of responses that accurately reflected their perceptions. Only registered nurses who are members of the National Association of Orthopedic Nurses in the United States were recruited to participate in this study. This may limit the generalizability of the findings from the study. Finally, this study was conducted in the United States only, so the findings from this study are only generalizable to nurses' pain management behaviors in the United States.

Recommendations for Future Research

Despite the increasing needs of management of postoperative pain in hospitalized patients, little research has been conducted to assess factors that play a role in nurses' intentions to administer opioid analgesics on an as needed basis for pain control to these patients. Further research could replicate this study with a larger population to include both members and nonmembers of the National Association of Orthopedic Nurses. The inclusion of nonorthopaedic nurses may result in different findings for some of the constructs from the Integrated Behavior Model that were measured in this study, namely self-efficacy, nurses' underlying beliefs, normative beliefs, control beliefs, pain management knowledge, and their intentions to administer PRN opioid analgesics.

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