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A Quality Improvement Initiative on Chronic Pain

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Abstract

Pain management is a key issue globally; with chronic pain prevalence rate of 20.4% among adults. This prevalence of chronic pain leads to a high number of emergency room visits resulting from or compounded by incidence of chronic pain. However, emergency room nurses are broadly unfamiliar with the appropriate practices for managing chronic pain, which may lead to both worsened care and ineffective emergency room function. As a result, there is a need for clearer practice guidelines for emergency room nurses. The purpose of this pre-post observational design study was to conduct a quality improvement initiative on registered nurses and emergency room nurse practitioners on how to treat and manage patients presenting with chronic pain. In this study, an educational newsletter intervention along with a roughly one-hour, seminar-style question and answer session was tested in a non-experimental pilot trial consisting of 24 nurse practitioners and registered nurses at a single hospital. An educational newsletter along with seminar-style question and answer session represents a low-cost way of conducting a quality improvement initiative on nurse education regarding pain management. The results showed that at a six-week follow-up, the quality improvement intervention significantly improved nurses' understanding of how to address chronic pain in the ER context. These results were statistically significant using a t-test. The intervention was effective and may represent an effective way to improve pain management knowledge in nurses.

Keywords: Pain management; Chronic pain; Emergency room; Emergency department; Educational newsletter; Question and answer session

Introduction

Chronic pain is defined as pain lasting longer than 12 weeks, even for months or years [1]. In the United States, 20.4% of the adult population suffers from some form of chronic pain, and over 7.4% suffers from a more incapacitating high-impact chronic pain as of 2019 [2]. The underlying causes of chronic pain may be difficult to treat because pain may interfere with the treatment process, resulting in issues such as insomnia or changes in appetite, mood, and stamina.

Many health professionals are not adequately prepared to address pain, especially in the Emergency Room (ER) context. This is problematic in that chronic pain is one of the major reasons patients present to the ER [3]. According to Thomas, approximately half of ER visits are due to patients seeking pain relief. Specifically in the Canadian context, around 10% of emergency department visits may be directly attributable to chronic pain [4]. Failures in pain management practice and education have in part given rise to opioid crises in the United States and in Canada. There have been several cases where opioid painkillers were overprescribed, even in situations where they were not necessary, resulting in some patients developing an opioid use disorder [5-7]. This has led to the U.S. Center for Disease Control (CDC) advising against the use of long-term opioids for patients with specific types of chronic pain such as axial low back pain and fibromyalgia [6]. However, emergency room practitioners remain inadequately educated regarding the appropriate ways of handling chronic pain in ER patients [4,8]. This dearth of understanding harms clinical practice and the ability to provide a key component of care for a large portion of ER patients.

Hence, the present study was carried out with the objective of pilot testing an educational intervention for ER nurses regarding chronic pain as part of a quality improvement initiative. The clinical question addressed in the study was: Will educating emergency room nurse practitioners and registered nurses (P) with an educational newsletter and a roughly one-hour, seminar-style question, and answer session on different types of pain (I) improve their clinical skills and management of patients presenting to the emergency room with chronic pain (O) over a 6-week period (T)?.

Literature Review

Pain management

The management of pain, inside and outside of the emergency room, has become a serious issue across nations [2,6]. The importance of pain management has increased significantly as a result of the over prescription of opioids. This has revealed a fatal flaw in the treatment that had become a standard,catch-all treatment for chronic pain yet has been misused, leading to significant issues of substance use [5]. With opioid usage having become considerably sparser, the

importance of knowledge regarding non-opioid and potentially non-biomedical pain management practices has soared [7]. This may be especially true in the ER context, where many patients present with pain-related issues, yet clinicians do not prioritize pain management [9].

The global scale of the issue of chronic pain has been documented in the literature. Research suggests that a lack of adequate understanding with regards to the treatment is a worldwide problem. For example, in a study of 13 European countries, Johnson et al. indicated that only 48% of primary care providers used pain assessment tools, 81%considered pain under-assessed, and 81-89% reported a lack of pain management knowledge and/or further education [10]. Similarly, in the context of Australian emergency departments, Bennetts et al. found a lack of priority given to patients' pain management and a significant gap between evidence-based practice guidelines and the day-to-day practice of emergency room nurses [9]. Such a large-scale issue calls for an exploration of possible interventions to improve practice.

Pain and the emergency room

As significant body of research corroborates Thomas' claim that pain relief represents not only a key outcome of emergency room care, but also a reason many patients go to the emergency room in the first place [3]. For example, Rash et al. found that individualized pain management plans could be a crucial way of reducing emergency room visits for an important subset of emergency room patients' [11]. In a meta-analysis, Wong et al. indicated the existence of at least 13 studies testing interventions such as pain policies, care coordination, or individualized care plans to reduce the repeated ER utilization of chronic pain patients [12]. However, despite this importance of pain management in the ER, because emergency rooms are often inadequately prepared to address patients with chronic pain, ER visits may result in suboptimal care for these patients [4].

Additionally, a lack of preparedness may also contribute to worsened outcomes for the ER as a whole because time spent ineffectively trying to address patients' chronic pain is time not spent effectively treating other patients [4,8]. Though not all potential ER pain management modalities have been adequately researched, there are many for which a substantial base of evidence exists and should be brought to bear in clinical practice [13]. Todd reviewed the approaches to pain management in the ER and found that many types of practice are well-validated, though there is a need for more research on non-opioid management approaches. The American Academy of Emergency Medicine has also provided practice guidelines, but the body of research suggesting a lack of pain management expertise in the ER [4,8] indicates that these guidelines are not yet widely integrated into practice.

Cognitive learning theory

As the present study sought to test an intervention for improving nurses' knowledge of pain management, an educational theory to underlie the intervention was necessary. There are many theories of learning used today, but the cognitive approach to learning was deemed most relevant, primarily because this study sought to test a lightweight, context-independent instrument of education. Cognitive learning theory is one of the most basic approaches to learning, one that focuses on cognitive understanding of information [14]. In cognitive learning theory, both internal and external factors work to affect a learners' understanding of educational material [15]. Within this context, the proposed educational intervention serves as a lightweight, easily understood mechanism of imparting knowledge from an external source [16]. It is assumed that the learners, registered nurses, already possess the motivation and desire to provide better care for their patients, given their career choices. Therefore, rather than seeking to influence these internal components of learning, the proposed study leverages the external aspects of cognitive learning theory to provide nurses with the cognitive tools-namely, knowledge of established and recently emerged best practices-with which to put their desires into practice.

Methodology

Method and design

The present study is a quantitative trial of an educational intervention for emergency department management of chronic pain as part of a quality improvement initiative. The study comprised a pilot test, but at a reasonably large scale (n=24). A quantitative pre-post observational design was employed to test the proposed educational intervention and determine if it created a meaningful difference in educational outcomes as measured by a pain management knowledge questionnaire within a non-randomized single group setting. A pre-post observational design is appropriate to test the difference between two groups in a non-experimental setting. The intervention tested in this study would be suitable for use in the experimental context, but a non-experimental pilot test was deemed a more practically feasible way to test its utility initially in a real-world hospital context. Hence, while the results cannot provide the certainty of a causal effect, they do effectively test whether or not the intervention was associated with a significantly improved knowledge of chronic pain management in the emergency setting.

Population and sample

The broad population of interest was nurse practitioners and registered nurses employed by emergency rooms/emergency departments. The specific target population was all nurse practitioners and registered nurses employed at a single emergency department in a small coastal hospital in the United States. The emergency room where the project was implemented employs over 50 people, with five nurse practitioners and 20-30 registered nurses working part- or full-time. To protect the participants and institution, no more specific information about the hospital is provided.

From within this population, the sample was recruited at random using a lottery method. After identifying the 35 prospective participants, 25 of the 35 names were drawn at random. The resulting 25 nurse practitioners and registered nurses were requested to participate in the sample, which 24 of 25 agreed. Participant demographics are outlined in the results section. These participants represented the pre- and post-test sample as well as the population to whom the intervention was provided as detailed below. All participants were assigned code names to protect their confidentiality, and all data regarding the sample presented in the results section are anonymized quantitative data.

Intervention and instrumentation

Intervention

The intervention tested in this study consisted of an educational, self-learning newsletter and participation in a roughly one-hour, seminar-style question, and answer session. The newsletter was developed as a convenient method of conveying relevant information to nurses with the intention that they could read it and use it as a reference for learning about pain management best practices. The participants could read and reread the newsletter at their own time. The focus of the educational newsletter was the understanding of chronic pain and its management in the emergency setting. This newsletter was drafted based on the consensus in the research and known professional best practices regarding managing chronic pain. Several resources, particularly from the American Chronic Pain Association and the Ohio Emergency Acute Care Facility, were utilized for the creation of the newsletter. Additionally, the Nursing Manager and the Nursing Research Council were also consulted to discuss the course, literature review, risk, and benefits of the intervention. The resulting newsletter was eight pages long, not including references which were provided both to validate the content of the letter and to provide the participants with additional resources through which they might pursue further self-education if they so desired. If the nurses required further information regarding any specific topic in the newsletter, the references section afforded them a way of looking at the original source of the information for a more detailed explanation. However, none of the participants reported accessing additional information from the references.

Pre/post-test

The measure for the study's outcome variables was a 15-item assessment used to test participants' knowledge of and comfort regarding addressing chronic pain in the emergency room setting. The pre- and post-test assessments used the same 15 items. Fourteen of 15 items were true/false, while the 15th was multiple choice. The assessment was based on the literature and professional best practice guidelines for addressing chronic pain. Where possible, the knowledge of best practices was taken from official organizational guidelines issues by national health bodies or professional associations. Otherwise, the items represented consensus conclusions in the literature that were supported by high-quality evidence such as randomized control trials.

Data Collection

Data collection for the study proceeded as follows. IRB approval was obtained from the University and approval was obtained from the Nursing Research Committee and Nursing Director at the institution where the study was conducted. Then, using the randomized lottery process 25 prospective participants were selected. Of these, 24 participants expressed interest. The participants gave their consent to partake in study by signing an informed consent documentation provided to them. After all forms of approval were obtained, the study began.

At this point, the participants were provided with the pre-test assessment, along with a demographic questionnaire related to age, gender, occupational status, and highest level of education. Once the pre-test was completed, the self-learning newsletter was distributed to the participants and a roughly one-hour, seminar-style question and answer session was held. Following the review of the newsletter and question and answer session, the clinicians were provided the post-test assessment after a six-week internal, allowing the study to assess not only the acquisition of knowledge, but its retention. The news letters were collected after the seminar, along with any other documents. These items were kept secure during the collection process and then stored in a locked box in the researcher's home office until data analysis occurs.

Results

Participant demographics

Data were collected from a combined sample of 24 nurse practitioners and registered nurses. All participants were employed by the same emergency room. Table 1 shows a description of these participants, where 29.2% (n=7) were APNs, and 70.8% (n=17) were RNs.

	N	Percent
Occupation		
APN	7	29.2
RN	17	70.8

Race		
Non-Hispanic White	23	95.8
Hispanic Multiracial	1	4.2
Work Status		
Full-Time	19	79.2
Part-Time	5	20.8
Level of Education		
Diploma	1	4.2
Associate's Degree	9	37.5
Bachelor's Degree	7	29.2
Master's Degree	7	29.2
	Mean	SD
Age	41.5	12.3
Years as an RN	15.4	13
Years Worked in the ED	8.8	10.4
Hours Worked Each Week	32.4	10.5

Table 1: Summary of demographics

The sample was almost exclusively non-Hispanic White (95.8%, n=24), with one participant (4.2%) being Hispanic Multiracial. Most of the participants worked full-time (79.2%, n=19), with 20.8% (n=5) working part-time. The participants' level of education differed. The most common level of educational attainment was an Associate's Degree (37.5%, n=9), followed by Bachelor's Degree (29.2%, n=7), and Master's Degree (29.2%, n = 7). The ages of the participants varied significantly, ranging from 24 to 68 years, with an average age of 41.5 years old (SD=12.3). Participants also had a wide range of professional experience; their years working as an RN ranged from 6 months to 47 years, with an average value of 15.4 years (SD=13.0). Years working in an ED were similarly distributed but lower on average, ranging from 5 months to 44 years, with an average value of 8.8 years (SD=10.4). And finally, hours working per week ranged from 4 to 48 hours, with an average value of 32.4 hours (SD=10.5).

Data collected

The study variables of interest were pre- and post-test scores, each of which reflected the percentage of correct answers on a 15-question test of knowledge. Percent correct scores could range from 0 to 100%, Table 2 shows a summary of pre and posttest scores, where pretest scores ranged from 60% to 100%, with an average of 77.2 (SD=10.0). Posttest scores ranged from 86.7% to 100%, with an average of 96.1 (SD=5.2). This reflects a significant improvement, but this conclusion was tested using inferential statistics.

	Mean	SD	Min	Max
Pre-test	77.22	10.01	60	100
Post-test	96.11	5.17	86.67	100

Table 2: Summary of pre and post-test Score

Analysis results

To determine if the difference between the pre and posttest scores were significantly different, a paired samples t-test was

employed as the pre- and post-test scores represented two values from the same sample. Results of the paired samples t-test showed that posttest scores were significantly higher than pretest scores (t=-8.64, p<0.0001). This implied that the implementation of the self-learning newsletter and seminar-style question and answer session on chronic pain management led to a significant increase in participants' knowledge of chronic pain. The average pre- and post-test scores are reflected in Table 2.

To determine if RNs with higher education had better pre/post scores, the researcher performed a repeated measures analysis of variance (ANOVA). For this analysis, the one RN with a high school diploma was grouped together with those RNs who held an Associate's Degree, whereas those who held a Bachelor's Degree and those who held a Master's Degree each constituted their own groups. Hence, the ANOVA was conducted across three groups (Diploma/A.S., Bachelor's, and Master's). Results of the analysis showed that overall, post scores were significantly higher than pre scores (p < 0.0001), but there was no significant difference in the degree of this change by RN education (p=0.099). Figure 1 shows average pre and posttest scores by RN education groups.

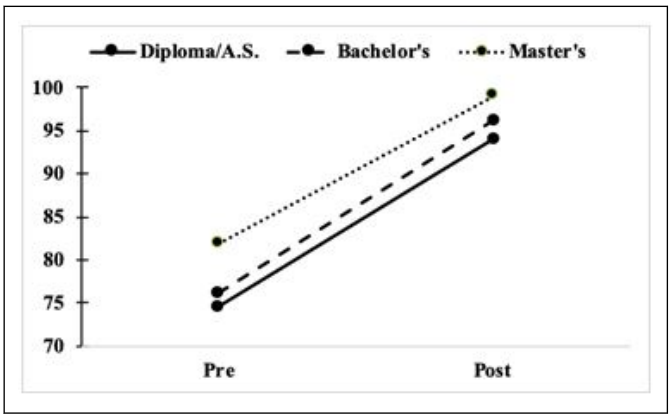

Figure 1: Summary of pre-and post-test scores by RN education group.

Finally, in order to determine if RNs with more years of experience had better pre/post scores, a second repeated measures ANOVA was employed. In the testing of group differences for experience, RNs were divided into two groups: those with at least 15 years of nursing experience and those with less than 15. Results of the analysis showed that overall, post scores were significantly higher than pre scores (p < 0.0001). However, as in the analysis for education level, there was no significant difference by RN education (p=0.495). Figure 2 shows the average pre and posttest scores by RN years of experience groups.

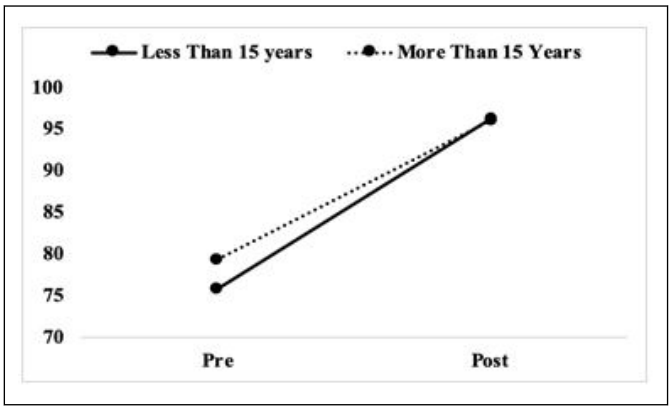

Figure 2: Summary of pre-and post-test scores by RN years of experience groups.

Discussion

In summary, it was determined from the results of the inferential statistics that the educational intervention tested in the study as part of a quality improvement initiative had a statistically significant effect in terms of improving the participants' knowledge of chronic pain management in the emergency care context. The effectiveness of the intervention did not differ across educational levels or based on professional tenure. The implications of this findings are discussed, as well as the ways in which the results were limited.

Implications

In the literature, researchers have found that the majority of providers and registered nurses suggested that they do not think of pain management as the highest priority; thus, the sample expressed that chronic pain control can be helped but not managed in the emergency department [9]. However, many chronic pain patients are repeated ER patients [12]. Failure to adequately treat these patients results in worsened outcomes in multiple regards-both for the patients and for the ER itself [4,8].

The present study provides key evidence that a simple educational newsletter along with a seminar-style question and answer session can significantly boost ER nurses' knowledge of chronic pain and knowledge regarding best practices. This outcome is increasingly important as the fallout from the opioid epidemic has made the once-staple painkiller something that physicians are significantly more wary of prescribing [17]. Based on the literature, the improved knowledge of good clinical practice regarding pain management in the ER resulting from this intervention should help improve ER practice. Since the intervention (newsletter and seminar-style question and answer session) resulted in improved knowledge on the part of nurses, the results of the study suggest that the educational newsletter approach used in this study along with seminar-style question and answer session can be applied to improve nurses' pain management knowledge at a low cost. This outcome provides a potential to benefit in the form of both better care for chronic pain patients and wasting less scarce ER resources on ineffective attempts to treat these patients.

The present study is particularly relevant because the intervention is not resource intensive. The entirety of the intervention consisted of researching best practices and creating the newsletter, distributing it to nurses, and participating in a roughly one-hour, seminar-style question, and answer session. Hence, should additional research fully validate this approach, it would represent a low-cost approach to improving pain management practices in the emergency care setting, one which hospital and ER leaders could enact without either significant financial burden or a high cost in clinicians' time as many other educational interventions require.

Additionally, the results of the study are supportive of the cognitive approach to learning. Working from the assumption that nurses have the necessary desire to improve and motivation to implement better practices, the study's intervention focused on providing raw knowledge in a comprehensible and lightweight form. The intervention resulted in a statistically significant increase in nurses' knowledge of pain management, which supports this interpretation.

Limitations

There were several limitations in this study. The first was the sample size. Although 24 participants is a large number by the standards of pilot tests, it still fails to reach the threshold for statistical power in the significance of the results. A same-sample t-test requires at least 34 participants to achieve 80% statistical power for a significance level of 0.05 and a medium effect size. That being said, this limitation was offset by the extremely high significance level that was achieved in the test ($p < 0.0001$). Still, a larger sample might have allowed for the detection of group level effects in the secondary portions of the analysis. This limitation was also compounded by the demographic profile of the participants, which resulted in an all-female sample and a vast majority of the participants being non-Hispanic Whites. The lack of representation of male or African American nurses and the low representation of Hispanic nurses means that the generalizability of the study to nurses from different demographic backgrounds is less than clear.

Another limitation of the study was its pre-post observational design. This design did not include randomization or a control group. This weaker design was chosen as a way of testing the intervention while requiring a less strenuous experimental procedure, and in that regard was adequate for the purposes. However, to fully validate the intervention and prove its causal effect, a fully experimental approach with randomization, a control group and larger sample size is required.

A third limitation in this study was the follow-up period. Participants' post-test assessment came six weeks after the intervention. This interval was enough to demonstrate a reasonable level of retention of the clinical knowledge gained from the educational intervention. However, understanding if the intervention will affect long-term clinical practice would require a follow-up post-test at least one year after the intervention was conducted. Information regarding the length of retention is crucial for determining the applications of the intervention and setting the recommended re-education period after which clinicians should be offered an updated refresher newsletter. Finally, in the existing literature, there have been a number of well-known practice effects relevant in the context of test-taking. It cannot be ruled out that some degree of the change found between pre-test and post-test in scores reflected the fact that the test was taken twice.

Declarations

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Conflicts of interest

The author has no relevant financial or non-financial interests to disclose.

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