Med & Health 2016; 11(1): 62-71 http://dx.doi.org/10.17845/MH.2016.1101.09

ORIGINAL ARTICLE

Structured Education Programme on Patient Controlled Analgesia (PCA) for Orthopaedic Patients

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ABSTRAK

Analgesia kawalan pesakit (PCA) melalui pam infusi membolehkan pesakit untuk mengawal analgesia mereka sendiri. Tujuan kajian ini adalah untuk menilai kesan program pendidikan analgesia kawalan pesakit (PCA) dari segi kesakitan pos pembedahan dan kepuasan pesakit dengan PCA selepas pembedahan ortopedik. Kajian bentuk kuasi-eksperimen pra dan pos rekaintervensi dengan pelaksanaan program pendidikan pesakit di PCA yang diberikan kepada 54 responden. Kumpulan kawalan diberi taklimat PCA konvensional dari protokol Acute Pain Service. Tahap kesakitan diukur pada 2 jam, 6 jam dan 24 jam selepas pembedahan dengan menggunakan ujian pra dan pos dari pada pra dan ujian pos dengan penggunaan "Revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R)". Hasil kajian menunjukkan perbezaan median respon tahap skor kesakitan oleh responden kawalan pada 2 jam, 6 jam dan 24 jam selepas pembedahan, ialah 7.00 (IQR = 3.00), 5.00 (IQR = 2.00) dan 3.00 (IQR = 2.00); kumpulan interventasi pada 2 jam, 6 jam dan 24 jam selepas pembedahan adalah 6.00 (IQR = 2.00), 3.00 (IQR = 1.00) dan 1.00 (IQR = 1.00). Terdapat perbezaan yang signifikan dalam median skor kesakitan antara kumpulan interventasi dan kumpulan kawalan bagi 2 ($U = 142.0$, $p < 0.05$) , 6 ($U = 150.50$, $p < 0.05$) dan 24 ($U = 120.00$, $p < 0.05$) jam selepas pembedahan. Terdapat perbezaan statistik yang signifikan ($p < 0.05$) dalam median tahap sakit pesakit di semua peringkat kesakitan biasa, kesakitan teruk, dan kesakitan yang amat teruk antara kumpulan interventasi dan kumpulan kawalan (kesakitan biasa, $U = 219.50$, $p < 0.05$, kesakitan teruk , $U = 117.0$, $p < 0.05$; kesakitan yang amat teruk, $U = 49.0$, $p < 0.05$). Kesimpulannya, pesakit yang menerima program pendidikan berstruktur pra-pembedahan menunjukkan peningkatan dalam menguruskan kesakitan selepas pembedahan dan kepuasan pada PCA selepas pembedahan ortopedik.

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Kata kunci: *analgesia kawalan pesakit (PCA), ortopedik, pesakit, pendidikan, program*

ABSTRACT

Patient-controlled analgesia (PCA) via an infusion pump enables patient to administer their own analgesia. The aim of this study was to evaluate the effect of an educational programme in managing post-operative pain and satisfaction on PCA following orthopedic surgery. A pre-test and post-test interventional study design with implementation of patient education programme on PCA was provided to 54 respondents. The control group received conventional PCA briefing from the Acute Pain Service protocol. Pain intensity was measured at 2 hrs, 6 hrs and 24 hrs following surgery and pre-test and post-test of the Revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R) was administered. There was difference in respondents' level of pain score among the study respondents' medians for control group at 2 hrs, 6 hrs and 24 hrs following surgery and they were 7.00 (IQR=3.00), 5.00 (IQR=2.00) and 3.00 (IQR=2.00); intervention group at 2 hrs, 6 hrs and 24 hrs following surgery were 6.00 (IQR=2.00), 3.00 (IQR=1.00) and 1.00 (IQR=1.00) respectively. There were significant differences in median of pain score between intervention and control group at 2 (U=142.0, $p<0.05$), 6 (U=150.50, $p<0.05$) and 24 (U=120.00, $p<0.05$) hrs following surgery. There were statistically significant differences ($p<0.05$) in the median of patient's pain severity at all pain levels i.e. least pain, worst pain, and severe pain between intervention and control group (least pain, U=219.50, $p<0.05$; worst pain, U=117.0, $p<0.05$; severe pain, U=49.0, $p<0.05$). In conclusion, patients who received pre-operative structured education programme showed improvement in managing post-operative pain and satisfaction on PCA after orthopedic surgery.

Keywords: patient-controlled analgesia (PCA), orthopedic, patients, education, programme

INTRODUCTION

Post-operative pain is a common problem experienced by patients following surgery. Often, it is not treated appropriately and leads to serious discomfort and delayed recovery from surgery. Nurses are in a unique position to supervise and assist patients in pain treatment, considering the extensive time nurses spend with the patients when compared to other healthcare professionals. Nurses are involved in assessing pain, administering analgesics, and monitoring the effect of medications (Ho et al. 2009). There is a gap between 'saying and doing', despite adequate knowledge about core issues in post-operative pain management. Often this is not practiced in clinical settings (Dihle et al. 2006).

Intravenous Patient-Controlled Analgesia (PCA) which depends

primarily on self-administration of analgesics for relief has become a routine method of post-operative pain management. Studies confirmed that PCA, has proven efficacy, is convenient in providing rapid onset of analgesia and high rate of patient satisfaction (Chumbley & Mountford 2010; Viscusi & Schechter 2006). It is essential to assess suitability of this method of pain relief for the individual patient before commencing PCA. PCA is suitable for patients who have moderate to severe acute pain and who have been educated to use it in a healthcare setting where nurses also have been trained in its management (Chumbley & Mountford 2010).

The ability to autonomously and immediately treat pain has been shown to reduce pain-related anxiety and stress among patient post-operatively. The use of PCA have been associated with better pain management, faster recovery of activities and shorted length of hospital stay (Herr et al. 2011; Hudcova et al. 2006). Inadequate post-operative management can negatively influence surgical outcomes, and may lead to chronic pain (Guo et al. 2012; Chumbley & Mountford 2010). Patient's ignorance and lack of proper knowledge related to pain management may further increase barrier to obtain and optimize pain control. This lack of knowledge may influence how often they could request medication and PCA allowable medication dose (Palmer & Miller 2010).

The Acute Pain Service (APS) team in Hospital Tuanku Jaafar Seremban (HTJS), treats nearly 800 to 900 patients who undergo surgery every month. The orthopedic patients account to 300 cases (40%). Although, patient-controlled analgesia (PCA) has been used at HTJS, there is paucity of data related to patients from different cultures who experience the same intensity of pain but may not report or respond to it in the same way. A structured educational programme regarding PCA, would be able to improve the effectiveness of pain control, patient's comfort and satisfaction.

The present study was designed to provide pre-operative PCA education to orthopedic patients in the proper usage of PCA, and to evaluate the effect of such educational programme in patient satisfaction on PCA following orthopedic surgery.

MATERIALS AND METHODS

DESIGN

A pre-test post-test interventional study design was conducted in the Orthopedic units at Hospital Tuanku Jaafar Seremban (HTJS) with the intervention group provided with a structured educational programme pre-operatively on PCA using a flip chart and brochure. On the other hand, the control group received a conventional education on PCA using the Acute Pain Service (APS) protocol.

PARTICIPANTS

The recruitment of respondents was from scheduled elective orthopedic surgery, where a pre-anesthesia assessment was performed by the Anesthesiologist. Respondents who fulfilled the inclusion criteria were

recruited and prescribed on the PCA for post-operative pain management. A total number of 62 respondents were recruited and the response rate was 87% with 8 respondents being excluded (transferred to other units, admitted to Intensive Care Unit (ICU) post-operatively, discharged sooner than 3 days post-operatively, communication problem due to language and cancelled surgery). In total, 54 respondents scheduled for orthopedic operation with patient control analgesia (PCA) were recruited for the study with informed consent and were divided equally into two groups (intervention and control) (n=27 in each group).

DATA COLLECTION AND INSTRUMENTS

The research instrument consisted of socio-demographic data. Pain intensity was measured using a numerical rating scale (NRS) for patient self-reporting of pain from 0–10, based on an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage by International Association for the Study of Pain, (IASP) and lastly a Revised (APS-POQ-R) for quality improvement of pain management consisting of 21 items scored using 0 to 10 scales. The questionnaire was piloted in clinical sites in local Malay language which has been validated (Rothaug et al. 2013).

STRUCTURED EDUCATION PACKAGE

The structured educational package on the Patient Controlled Analgesia (PCA), was adapted from St John of God Hospital with permission obtained. It consisted of a flip chart and brochure in English, was translated to Malay version by a Surgeon from Department of Surgery, Universiti Kebangsaan Malaysia Medical Centre and translated back by an Anaesthetist from Department of Anaesthesiology and a Family Medicine expert from International Medical University (IMU).

ETHICAL APPROVAL

The research was approved by the Ethics committee of UKMMC (FF-2013-475), Director of Hospital Tuanku Jaafar Seremban (HTJS) and National Medical Research Register (NMRR). The privacy and confidentiality of each individual was maintained and the respondents were given the rights to withdraw from participation.

DATA ANALYSIS TECHNIQUE

Data analysis for this study was done using Statistical Package for Social Science (SPSS) version 22. The respondents' NRS and Revised (APS-POQ-R) score before and after intervention were both analyzed using Wilcoxon Rank Sum test to compare the mean rank as the data was not normally distributed. The relationship between socio-demographic profiles with pre-test and post-test NRS and Revised (APS-POQ-R) were analyzed by inferential stastics of Mann-Whitney test.

RESULTS

The socio-demographic data was tabulated (Table 1). The total number

of respondents were 54 and there were equally divided in both arms (27 respondents as intervention group and 27 respondents as control group). The mean age of all respondents was 31.96 ±14.68 yrs, respondents in intervention group were younger than those in the control group (29.85 ± 15.07 vs 34.07 ± 14.26). There was equal distribution of all respondents according to age groups; below 31 yrs old (48.1%) and above 32 yrs old (51.9%). Majority of the respondents in both groups and in total were males (27.8% in control group and 37.0% in intervention group). More than half (61.1%) of the respondents were married, and this accounted to 19 respondents in the control group and 14 respondents in the intervention group. Malay respondents formed 46.3% of the study population, whereas 53.7% were Chinese and Indians.

LEVEL OF PAIN SCORE AMONG THE STUDY RESPONDENTS

Table 2 showed the level of pain score among the study respondents. Three time points were analyzed i.e. 2 hrs, 6 hrs and 24 hrs following the surgery. All patients had moderate to severe pain in the first 2 hrs following surgery. Six hrs following surgery, about 37.0% of patients had no pain to mild pain, and this included 4 patients in the control group and 16 patients in the interventional group. Majority of the respondents however, still had moderate pain to severe pain (63.0%) and this accounts for 23 patients from control group and 11 patients in the intervention group. Following 24 hrs of surgery, majority of the respondents (83.3%) had no pain to mild pain and only 16.7% of the respondent's experienced moderate pain to severe pain. Twenty-five respondents from intervention group and 20 patients from control group experienced no pain to mild pain, whereas 2 patients and 7 patients from intervention and control groups, respectively had moderate to severe pain, 24 hrs following surgery.

DIFFERENCES IN LEVEL OF PAIN SCORE AMONG THE STUDY RESPONDENTS

The difference in the level of pain score among the study respondents' medians for control group at 2 hrs, 6 hrs and 24 hrs following surgery were 7.00 (IQR=3.00), 5.00 (IQR=2.00) and 3.00 (IQR=2.00), respectively. On the other hand, medians for intervention group at 2 hrs, 6 hrs and 24 hrs following surgery were 6.00 (IQR=2.00), 3.00 (IQR=1.00) and 1.00 (IQR=1.00), respectively. Significant differences in median of pain score between intervention and control group at 2 (U=142.0, $p<0.05$), 6 (U=150.50, $p<0.05$) and 24 (U=120.00, $p<0.05$) hrs following surgery were tabulated (Table 3). It could be concluded that pain level at 2, 6 and 24 hrs following surgery in the intervention group was significantly lower than the controlled group.

LEVEL OF PATIENT SATISFACTION BETWEEN CONTROL AND INTERVENTION GROUP IN TERMS OF PAIN SEVERITY

The findings of this study reported the respondents' level of pain severity with the median for the least pain in the

Table1: Demographic characteristics of the study respondents

Characteristic	Variable	Group		Total [n=54 (%)]
		Controlled [n=27 (%)]	Intervention [n=27 (%)]	
Age (yrs)	Mean ± std	34.07 ± 14.26	29.85 ± 15.07	31.96 ± 14.68
Age group (yrs)	≤ 31 yrs	10 (37.0)	16 (59.2)	26 (48.1)
	≥ 32 yrs	17 (63.0)	11 (40.8)	28 (51.9)
Gender	Female	12 (44.4)	7 (26.0)	19 (35.2)
	Male	15 (55.6)	20 (74.0)	35 (64.8)
Marital status	Single	8 (14.8)	13 (24.1)	21 (38.9)
	Married	19 (35.2)	14 (25.9)	33 (61.1)
Race	Malay	12 (22.2)	13 (24.1)	25 (46.3)
	Others (Chinese + Indian)	15 (27.8)	14 (25.9)	29 (53.7)

Table 2: Level of pain score among the study respondents

Characteristic of Pain Intensity Scale	Group		TOTAL [n=54 (%)]
	Controlled [n=27 (%)]	Intervention [n=27 (%)]	
Pain score 2 hrs after surgery:			
No pain to mild pain			
Moderate pain to severe pain	27 (50.0)	27 (50.0)	54(100.0)
Pain score 6 hrs after surgery			
No pain to mild pain	4 (7.4)	16 (29.6)	20 (37.0)
Moderate pain to severe pain	23 (42.6)	11 (20.4)	34 (63.0)
Pain score 24 hrs after surgery:			
No pain to mild pain	20 (37.0)	25 (46.3)	45 (83.3)
Moderate pain to severe pain	7 (13.0)	2 (3.7)	9 (16.7)

first 24 hrs in control and intervention groups being 3.00 (IQR=2.00) and 2.00 (IQR=2.00), respectively (Table 4). For worst pain following first 24 hrs, the median for control and intervention groups were 8.00 (IQR=3.00) and 5.00 (IQR=2.00), respectively. The median scores for severe pain in the first 24 hrs were 40.00 (IQR=20.00) in the control group and 20.00 (IQR=20.00) in the intervention group. There were statistically significant differences (p<0.05) in the medians of patient's pain severity at all pain levels i.e. least pain, worst pain, and severe pain between intervention and control group (least pain, U=219.50, p<0.05; worst pain, U=117.0, p<0.05; severe pain, U=49.0, p<0.05). These findings showed that the intervention group had significantly lower pain severity following 24 hrs of surgery, at all pain severity level tested

Table 3: Differences in level of pain score among the study respondents

Pain Score	Mann-Whitney test			
	Median (Inter-quartile range)		U-Value	*P* value
	Controlled (n=27)	Intervention (n=27)		
2 hrs after surgery	7.00 (3.00)	6.00 (2.00)	142.00	P<0.05
6 hrs after surgery	5.00 (2.00)	3.00 (1.00)	150.50	P<0.05
24 hrs after surgery	3.00 (2.00)	1.00 (1.00)	120.00	P<0.05

*P value < 0.05 significant differences

*IQR-Inter quartile range

Table 4: Pain severity among the study respondents

Pain Severity	Mann-Whitney test			
	Median (Inter-quartile range)		U-Value	P value
	Controlled (n=27)	Intervention (n=27)		
Least pain in 1st 24 hrs	3.00 (2.00)	2.00 (2.00)	219.50	P<0.05
Worst pain in 1st 24 hrs	8.00 (3.00)	5.00 (2.00)	117.00	P<0.05
Severe pain (%)in 1st 24 hrs	40.00 (20.00)	20.00 (20.00)	49.00	P<0.05

*P value < 0.05 significant differences

*IQR-Inter quartile range

(least pain, worst pain, severe pain) compared to the control group.

DISCUSSION

This study reported respondents' level of pain of 2 hrs, 6 hrs and 24 hrs following surgery and in the intervention group, it was significantly lower than the control group. The trend showed more respondents in the intervention group to have lesser pain than the control group, progressively through the hours. In terms of pain outcomes during the first 24 hrs, pain levels decreased in both groups from 2 hrs post-surgery to 6 hrs, and from 6 hrs to 24 hrs, post-surgery. The changes in pain level over time across both groups showed better trend in pain reduction, indicating the impact of educational intervention on pain outcomes during the first 6 hrs. The results of the present study confirm that the participants in the intervention group experienced better pain control than the control group participants for the first 24 hrs, post-surgery. The findings of the present study were consistent with previous studies (McNicol et al. 2015; Lovell et al. 2010). The findings indicated the positive effect of educational intervention on pain management following orthopedic surgery (Ho et al. 2015; Hong & Lee 2012). The results also revealed that structured pre-operative teaching, using a booklet and allowing time for the learner to ask questions for clarification, is an effective teaching method. The use of written and verbal communication

reinforces the information provided. When only verbal instructions are used, information could be misunderstood by the learner. This would not be a problem with written information but when only written instructions are used, the learner may not understand the information presented if time is not allowed for questions to be answered. Also, better pain control observed in the intervention group could be related to the amount of analgesic used, which was influenced by the pain belief held by each individual.

In the present study, the effect of pre-operative structured education about Patient-Controlled Analgesia (PCA) on post-operative pain between the control and intervention groups concluded that pain level at 2 hrs, 6 hrs and 24 hrs following surgery in the intervention group was significantly lower than the control group. Hence, this study deemed that the intervention group was seen to be an effective mode of training for the use of PCA in terms of pain scores and were consistent with findings from previous studies (Ho et al. 2015; Park et al. 2006). This was in contrast with other studies that stated that there were not significant improvement in pain scores and outcomes (Guo et al. 2012; Lovell et al. 2010). Despite the mixed findings from previous reported studies, the current findings obtained proved the effectiveness of the structured pre-operative education programme used in this study as it has achieved expected outcomes-improvement in pain score among the intervention group. This may be attributed to more effective teaching or demonstration method to the patients on PCA use, compared to the earlier studies with negative findings. It may be concluded that patients felt better informed and less confused after pre-operative written and video presentation on the use of PCA, which directly showed the effect on patient's pain level.

The effects of pre-operative structured education programme on the level of patient satisfaction were evaluated by comparing control and intervention group in terms of pain severity, interference with function and activities, affective experience, side effects, perception of care. The present study showed that the intervention group had significantly lower pain severity, interference with functions and activities, and affective experiences; and higher perception of care compared to the control group. However, in terms of side effects, the intervention group had equal side effects compared to the control group. This study indicated that the implementation of pain education noticeably increased satisfaction scores among the patients compared to the satisfaction scores in the control group. This result was similar to previous studies (Hong & Lee 2012). The results was similar to a past study which showed that systematic teaching was an effective method of improving patients' satisfaction on the use of a PCA suggesting that the current intervention improved patient's pain severity, interference with function and activities, affective experience, side effects, perception of care (Hong & Lee 2012). Hence, an educational programme is indeed effective in improving satisfaction with pain management.

This study expands the current knowledge with regard to the effect of structured pre-operative education programme on pain score and level of satisfaction among patients using PCA. The present findings suggest that nurses and physicians caring for patients using controlled analgesia should provide a structured educational programme to help manage and ease the pain level post-surgery and increase the patient's satisfaction with pain management using PCA.

In addition, nurses are encouraged to emphasize pre-operative teaching in their practice. This information is very important for patients who are going to have surgery, as it gives them the opportunity to have control of the situation. Furthermore, it is important for health providers to consider patient satisfaction when attempting to improve adherence to pain management regimes in a clinical setting.

CONCLUSION

In conclusion, the present study had a positive impact of the educational programme in managing post-operative pain and satisfaction on PCA after orthopedic surgery in a hospital. The results of this study demonstrated great implications towards improving patient's satisfaction, compliance to the use of PCA and adherence to self-analgesic administration.

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