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Original Article

Imperative Role of Education of ICU Nurses regarding Postoperative Pain Management After Pediatric Cardiac Surgery

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ABSTRACT

Background: Management and evaluation of pain in children can be challenging due to difficulties in expression and verbalization. The imperative role of nurses in the assessment and management of pain should be considered. The aim of this study was to evaluate the role of the education of ICU nurses in pain assessment and measurement in order to reduce postoperative pain in children.

Methods: In this clinical trial, 146 children aged 3 to 15 years who underwent cardiac surgery were allocated to 2 groups. The control group (n=73) was managed routinely in that analgesics were administered as needed at the discretion of each anesthesiologist. In the trained nurses group (n=73), the ICU nurses received an education program including a pain assessment and treatment protocol. In both groups, pain scores were evaluated and recorded according to the Wong–Baker FACES Pain Rating Scale on the first and second postoperative day. Analgesics were administered to alleviate moderate and severe pain, and the nurse was asked to record all pain scores and analgesic drug doses.

Results: Pain scores on the second day decreased in both groups (P<0.001); however, this decreasing trend was steeper in the patients with trained nurses. Analgesic use was higher in the trained nurses group than in the control group (P=0.0001). The postoperative use of sedative drugs in the trained nurses group was less than that in the control group on the first postsurgical day but not on the second day (P=0.120).

Conclusions: Implementation of our pain management protocol by ICU nurses led to an increase in analgesic use and a decrease in sedative drug administration and better pain control in pediatric patients undergoing cardiac surgery. ***(Iranian heart Journal 2018; 19(2): 13-19)***

KEYWORDS: Nursing, Education, Pediatric, Pain management, Cardiac surgery

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Pain is an important and devastating postoperative complication and an unpleasant experience which many children encounter, mostly in cardiac surgeries. [1] Therefore, pain management in these patients is—albeit challenging—a major priority. [2-4] Pain can affect the healing process, increase the metabolic rate, and result in chronic pain. Postoperative pain management can reduce the length of hospital stay and improve quality of life, healing process, respiratory function, and oral intake. [3-6] Furthermore, physiological and psychological distress has been reported in pediatrics confronting pain. [1]

Pain assessment and management in children could be challenging owing to their difficulties in expressing and verbalizing their exact point of pain and severity. Moreover, pain is often not treated adequately and that is why different scales for pain assessment have been suggested. [2,3,7] The imperative role of nurses in the assessment and management of pain should be considered. [3] To manage postoperative pain, nurses in the intensive care unit (ICU) should be aware of the importance of pain and seek to control it. Due to misunderstandings regarding pain scores, various methods and protocols have been proposed to date to improve nurses' skills. [8]

Both pharmacological and non-pharmacological methods to treat postoperative pain have been proposed. Pharmacological agents include opioid and non-opioid drugs, which should be administered properly on the basis of pain scores. Non-pharmacological approaches include a comforting environment and parental reassurance and presence. [3, 9] Thereby, refinement of pain scores is of vital importance. Children are often under-medicated for the fear of respiratory depression. [10]

Despite various available methods, studies have shown that pain management to achieve optimal levels can be challenging and often not well understood. Pain after cardiac anesthesia has many side effects; therefore, a thorough understanding and management is crucial. The aim of the present study was to evaluate the effects of education of ICU nurses to use a standard protocol for pain assessment and measurement in children in order to reduce postoperative pain.

METHODS

In this clinical trial, 146 pediatric patients candidated for cardiac surgery were allocated to 2 groups. Patients were included if they were aged between 3 and 15 years, were extubated within 24 hours after surgery, and had parental consent for enrolment. Patients with underlying diseases such as those admitted to the operating room while intubated, those who were critically ill with their sternum left open, and those with already prescribed pain relief medications were also excluded from the study. With the approval of the medical ethics committee of the university, written informed consent was obtained from the patients' parents.

The control group (n=73) was managed routinely in that analgesics were administered as needed at the discretion of each anesthesiologist. In both groups, pain scores were evaluated and recorded according to the Wong-Baker FACES® Pain Rating Scale on the first and second postoperative days. Re-evaluation of pain was performed 30 minutes afterward if analgesic drugs were administered to alleviate pain and the nurse was asked to record whether they had any injections. Additional administration of drugs was supervised by the physician. After a week, another 73 pediatric patients were entered into the study (trained nurses group). The evaluation of pain was as aforementioned; however, the nurses were provided with specific information and protocol for pain management. If the patient's pain score was 4 and above, the nurse would inform the physician. Again after 30 minutes, re-evaluation was recorded. According to the score pain, the child was treated with certain pain relief medication and doses. The scale was described as follows: no pain (0),

mild pain (1–3), moderate pain (4–6), and severe pain (7–10). The first-level pain relief was managed with non-opioid drugs (paracetamol 15 mg/kg). Moderate-to-severe pain was relieved with morphine sulfate (0.1–0.2 mg/kg every 4 hours) or fentanyl (1–2 µg/kg every 30–60 min).

Statistical analysis was performed with Statistical Package for Social Sciences (SPSS) for Windows, version 16.0 (SPSS Inc, Chicago, IL, USA). The Independent Samples *t* Test was used to compare the mean values between the groups. The Mann–Whitney *U* test and the χ^2 test were employed to compare differences in the non-parametric data and nominal data, respectively. A *P* value equal to or smaller than 0.05 was considered statistically significant (Fig. 1).

Figure 1. Wong–Baker FACES Pain Rating Scale

RESULTS

The demographic parameters and surgical data are presented in Table 1. Although significant differences were seen in terms of age and weight between the 2 groups, there were no meaningful differences regarding the other demographic data. Of the total of 146 patients, 78 were male, whereas 68 were women. Thoracotomy was less frequent than sternotomy in both groups, and the difference in surgical incision was not statistically significant between the 2 groups (*P*=0.087). The patients in the trained nurses group had a slightly longer intubation time than the control group (*P*=0.009); however, our assessment and evaluation of pain was started after the extubation of the children.

In the control group, the pain score ranged between 4 and 5 on the first postoperative day and decreased to about 2 to 3 late in the day. In contrast, in the trained nurses group, the pain score was lower (about 2–3) earlier on the first day. Overall, the pain scores on the second day decreased in both groups; still, this trend was statistically significant in the patients with trained nurses (*P*<0.001) (Table 2).

Opioid (mostly morphine) usage was higher in the trained nurses group than in the control group on both first and second postoperative days (Table 3). While the use of sedative/hypnotic drugs (mostly midazolam) after surgery in the trained nurses group was less than that in the control group on the first and second postoperative days, there was no difference between the 2 groups on the second day (Table 4).

Table 1. Demographic values and surgical data in the study groups

	Trained Nurses Group (n=73)	Control Group (n=73)	*P* value
Age, y	5.47±2.94	6.62±3.73	≤0.001
Weight, kg	19.02±11	21.96±11.79	≤0.001
Sex:			
male (%)	46.6	60.3	0.091
female (%)	53.4	39.7	
Diagnosis:			
cyanotic (%)	41.1	41.1	0.263
non-cyanotic (%)	58.9	58.9	
Surgical approach:			
open (%)	84.9	83.6	0.824
close (%)	15.1	16.4	
Surgical incision:			
sternotomy (%)	89.5	94.5	0.087
thoracotomy (%)	10.5	5.5	
Intubation time, h	10.47±5.77	8.32±3.86	0.009

Table 2. Wong–Baker FACES Pain Rating Scale in both groups

	Trained Nurses Group (n=73)	Control Group (n=73)	*P* value
Postop. day 1	2.36±0.48	4.99±.1.99	0.0001
Reevaluation after 30 min	2.33±0.47	3.40±1.44	0.0001
Postop. day 2	2.37±0.75	4.12±1.84	0.0001
Reevaluation after 30 min	2.30±0.46	3.18±1.27	0.0001

*All the data are expressed as means ± SDs.

Table 3. Analgesic drugs used for pain management in both study groups

	First Postop. Day		Second Postop. Day	
	Trained Nurses Group	Control Group (n=73)	Trained Nurses Group	Control Group
Paracetamol	5 (6.8%)	15 (20.5%)	7(9.6%)	16(21.9%)
Morphine	26(35.6%)	0	28(38.4%)	0
Morphine+Paracetamol	8(11.0%)	0	0	1(1.4%)
Fentanyl	0	0	0	1(1.4%)
No analgesic use	34(46.6%)	58 (79.5%)	38(52.0%)	55(75.3%)
Total	73 (100%)	73 (100%)	73 (100%)	73 (100%)
P value	0.001		0.001	

Table 4. Sedative drugs used in both study groups

	First Postop. Day		Second Postop. Day	
	Trained Nurses Group	Control Group	Trained Nurses Group	Control Group
Midazolam	0	21(28.8%)	0	3 (4.1%)
Phenobarbital	0	0	0	1(1.4%)
No analgesic use	73(100%)	52(71.2%)	73 (100%)	69(94.5%)
Total	73 (100%)	73 (100%)	73 (100%)	73 (100%)
P value	0.001		0.120	

DISCUSSION

The results of the current study showed that education in ICU nurses about pain assessment and management was able to reduce the pain score on the second day effectively. Pain management protocols confer acceptable insight to ICU staff and alleviate postoperative pain severity in children undergoing heart surgery. The implementation of the protocol increases use of opioids and decreases sedative drug administration. Nowadays, children still encounter pain throughout their ICU stay, and their parents complain about their miserable experience. Uncontrolled pain is still of a high level. [1,11,12]

Pain is a unique experience which has different expressions in individuals. It is a serious complication in the postoperative period with a high prevalence; management of this serious condition may be challenging—especially in children who cannot exactly describe their pain or other serious pathophysiologies. Measuring the severity of pain in children is problematic in that they are unable to exactly certify the location and severity of pain. [12,13]

Physiological and psychological improvement by pain management has been reported in previous studies. Pain control and management via routine protocols is expedient for patients. [12,14] Although subjective complaints of pain are the most important tool for the measurement of the severity of pain, children are not able to describe their pain efficiently. [15,16] Therefore, the use of various scales such as the Wong–Baker FACES® Pain Rating Scale can be of major benefit. Notably, efficient pain management in the first few days after surgery may increasingly lower postoperative chronic pain. [11,17] Previous studies have indicated that severe pain on the third postoperative day could be estimated as a predictor for chronic pain. [17,18] Previous studies have stated a higher incidence of chronic pain in younger ages. [13] Pain could impede the process of healing, and untreated pain may lead to chronic pain and affect other body organs. [5,6] Increased catecholamine release and stress hormones could influence the patient's hemodynamics.

In the present study, we demonstrated the benefits of using pain scales such as the Wong–Baker FACES® Pain Rating Scale and training ICU nurses for pain detection insofar as there was a reduction in pain and a decrease in opioid-based analgesic consumption on the first postoperative day among the study population. Given the frequent contact between nurses and patients, the role of the former in pain reduction and management is of great significance. Efforts have been previously made to understand, measure, and record children's pain levels with a view to controlling their pain fully and various guidelines and protocols have been proposed. [13,15] The use of subjective tools and description of pain as mild, moderate, and severe can help nurses measure and thereafter alleviate children's pain following surgery. Recent studies have emphasized on certain pain measurement tools, especially in specific groups like pediatrics. To that end, education of nurses in the ICU has been a major goal. Needless to say, proper pain management strategies can substantially decrease complaints of pain. [1]

CONCLUSIONS

The results of the current study suggest the imperative role of proper pain management education in ICU nurses in tandem with meticulous drug selection. The nurses in our study found the scale an easy tool for the description and assessment of pain. The development and clinical implementation of pain management protocols alongside conventional pharmacotherapy is of outmost importance in establishing standards and validating guidelines to offer solutions and render effective treatments.

Limitations

Our research has some limitations. Firstly, the allocation of patients to each group was not randomized. Indeed, we studied the control group in the first step and 1 week later set up the training course and then studied the second group. Accordingly, this study is a "quasi-experimental" and "non-randomized" trial. Secondly, we did not evaluate the pain score at different hours of the day. It is also deserving of note that the children in the trained nurses group were about 1 year younger than their counterparts in the control group (statistically significant difference); however, it seems that this different exerted no meaningful impact on pain assessment and treatment in our study. Thirdly, we did not follow up the patients with respect to chronic postoperative pain.

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Conflict of Interest

The authors declare no conflict of interest in this research.

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