Original Article
Efficacy of high-quality nursing in orthopedic trauma patients

Jiahui Guan[1*], Xia Jin[3*], Sanlian Hu[2]

Departments of [1]Emergency, [2]Nursing, Shanghai Jiao Tong University Affiliated Sixth People's Hospital, Shanghai, China; [3]Department of Outpatient, East Hospital of Shanghai Sixth People's Hospital, Shanghai, China. *Equal contributors and co-first authors.

Abstract: Objective: To explore the effects of high-quality nursing on the prognosis of orthopedic trauma patients. Methods: In this prospective study, 120 orthopedic trauma patients admitted to our hospital were randomized into a control group and an observation group, with 60 patients in each group. The control group received routine nursing, while the observation group received high-quality nursing. The length of hospital stay, pain relief, postoperative recovery profiles, and nursing satisfaction of the two groups were comparatively analyzed. Results: Before nursing, there was no significant difference between the two groups (P>0.05). After nursing, the postoperative indexes of the observation group were significantly better than those of the control group. Patients in the observation group had significantly better joint range of motion, shorter hospitalization time, lower incidence of complications, and higher nursing satisfaction scores than those in the control group (all P<0.05). Conclusion: High-quality nursing can relieve patients' pain and effectively improve their prognoses and satisfaction with diagnosis and treatment during hospitalization. It has sound clinical effects and is worthy of clinical application.

Keywords: High-quality nursing, orthopedic trauma, pain

Introduction

Orthopedic trauma is a common orthopedic disease which may be caused by accidents, such as car accidents, accidental fall, or collision [1]. In China, trauma, usually happens quickly and is unpredictable, is the third leading cause of death in the patients falling into the 18-44 age group, with up to 75% of the injuries affecting limb and spinal cord [2]. Therefore, patients in the orthopedic trauma departments are mostly at emergency. The causes of trauma tend to be more complex. The patients are usually in critical condition, accompanied by severe pain or dramatic hemodynamic changes. In a short time, patients can have rapid increases in blood pressure and heart rate and develop tachypnea, which are seriously life-threatening. Hence, quick and effective treatment is quite necessary for trauma patients [3-5]. Besides timely and effective treatment, the nursing during hospitalization is also critical to the conditions and prognosis. Because orthopedic trauma pati-

ents suffer from long-term physical and mental injuries, it is necessary to alleviate their physical and psychological pain, ease their psychological stress, so as to improve compliance, reduce the incidence of complications, and promote postoperative recovery [6, 7]. However, routing orthopedic nursing cannot effectively alleviate patients' psychological pain due to its weak sense of responsibility, indifferent attitudes, and lack of communication with patients [8].

High-quality nursing is a "patient-centered", holistic nursing mode, which is performed in all sides on patients to meet their requirements and improve their comfort [9]. Currently, in China, some hospitals still adopt the traditional nursing mode, but some have gradually adopted the high-quality nursing [10].

Whereas in developed countries, high-quality nursing has become a mainstream trend and has been applied to patients with various diseases, such as cardiovascular diseases, obstetrics, etc., all with good clinical results achi-

eved [11]. This study chose orthopedic trauma patients as the subject, who received different nursing modes, to explore the clinical effects of high-quality nursing in patients.

Materials and methods

General information

In this prospective study, 120 orthopedic trauma patients admitted to our hospital from January 2014 to December 2017 were selected and divided into the control group and the observation group according to a random number table method, with 60 patients in each group. The control group was given traditional routine nursing, while the observation group received high-quality nursing. Inclusion criteria: (1) patients over 18 years old; (2) patients with a fracture (such as limb fracture, thoracolumbar fracture, pelvic fracture, etc.) confirmed by CT and X-ray examination and requiring surgical treatment; (3) patients hospitalized for more than a week; (4) complete clinical data; (5) informed consent signed by the patient and his/her family. Exclusion criteria: (1) patients with chronic orthopedic diseases, such as osteomyelitis, gangrene and so on; (2) patients with serious diseases, such as cardiopulmonary insufficiency, vital organ damage, malignant tumor, unconsciousness or mental illness; (3) patients with a history of orthopedic trauma; (4) woman with pregnancy or nursing.

Nursing methods

Control group: Routing nursing mode was adopted, which included basic nursing, monitoring of the patients' vital signs, prevention and treatment of adverse reaction and complication (pulmonary infection, pressure injury, and venous thrombosis embolism), cleaning and sterilizing regularly, daily ventilation, timely guiding the patients to take deep breaths, cough, percuss back, etc., to prevent them from pulmonary infection; At the same time, the head nurse instructed the caregivers to turn over the patients regularly, check the state of the pressure area, massage muscle, and create a comfortable, clean and sanitary environment for them.

Observation group: High-quality nursing mode was adopted. In addition to routine nursing, the mode was carried out in physiological, psychological, rehabilitative, and health educational

aspects. It was managed by the head nurse and the nursing management department. First, the patients' pain-sensitive index was established, and their pains were quantified by the verbal rating scale (VRS) to have a clear rating for their pain index so that effective measures can be taken to alleviate their pains. Then, the nurses instructed them to fill in a Self-Rating Depression Scale (SDS) and a Self-Rating Anxiety Scale (SAS) to evaluate the patients' psychological status. The patients' pain complaints were taken seriously, and under the guidance of clinicians, their pains were relieved by administration of target-oriented analgesic (Ibuprofen tablets, Xiuzheng Pharmaceutical Group, China; Nimesulide sustained-release tablets, Grandpharma (China) Co, LTD.) or shift of attention by using certain methods. Second, the patients were given personalized psychological care. Orthopedic trauma patients will have some worries about the recovery effect. We should guide them timely, stabilize their emotions, enhance their rehabilitation confidence to enable them to actively and optimistically cooperate with the treatment and postoperative rehabilitation. The patients' physical and mental health were assessed, and a simple and personalized recovery plan was formulated. Attentions were paid to guide the patients and their families on the relevant diet and health education during nursing. Sufficient nutrition and energy can effectively promote the recovery and growth of bones, reasonable postoperative individualized rehabilitation guidance and exercise are conducive to the recovery from trauma. During nursing, we should give more care and consideration to patients, actively communicate with them, and timely understand their situation and needs.

Outcome measures

Pain: Within one week after the operation, the patients' pain was evaluated using VRS every day [12]. The higher the value is, the higher the degree of pain is.

Therapeutic efficacy: The patients' prognoses, mainly about the joint recovery (joint range of motion), adverse reaction, complications, and length of stay, were analyzed and compared. Meanwhile, the treatment compliance of the patients was rated and divided into three grades: complete compliance, partial compliance, and non-compliance. Compliance rate = (cases of complete compliance + cases of par-

Table 1. Comparison of general information ($\bar{x} \pm$ sd, n (%))

Obvervational index	Control group (n=60)	Observation group (n=60)	χ^2/t	P
Gender (male/female)	34/26	37/23	0.310	0.710
Age (years)	47.3±22.6	45.8±27.5	0.326	0.745
BMI (kg/m^2)	25.82±5.94	26.28±6.03	0.421	0.675
Educational level (case)			0.637	0.959
Elementary school	6	5		
Junior high school	10	12		
Senior high school	21	18		
Undergraduate	14	16		
Above undergraduate	9	9		
Fracture type (case)			0.211	0.976
Limb	25	26		
Thoracolumbar	17	15		
Pelvis	7	8		
Others	11	11		
Underlying diseases (case)			0.762	0.683
Hypertension	12	15		
Diabetes	4	3		
Cardiovascular disease	8	6		

Note: BMI, body mass index.

tial compliance)/total cases × 100%. Complete compliance means that patients actively cooperated with the operation instructions of the medical staff, with a high degree of completion of rehabilitation exercise (80% of the rehabilitation exercise indexes recommended by the doctors was completed). Partial compliance denotes that patients occasionally refused or did not cooperate with some treatment operations of the medical staff, with a moderate degree of completion of rehabilitation exercise (50% of the rehabilitation exercise indexes recommended by the doctors was completed). Non-compliance means that patients refused to cooperate with the medical staff's treatment guidance and treatment operation, with no rehabilitation exercise completed.

Mental health: Before and two weeks after the nursing, SDS and SAS were adopted to evaluate the emotion and psychology of the patients [13, 14]. When the scales were being filled, the nurses performing the nursing were blinded. The total score of each scale is 100, and the lower the score is, the better the patient's state is.

Nursing satisfaction: Before discharge, the satisfaction rating scale made by our hospital was used to let the patients evaluate the treatment and nursing quality. The total scores of this scale are 100, and the higher the score is, the higher the satisfaction degree is. Satisfaction degree = (cases of satisfaction + cases of average satisfaction)/total cases × 100%.

Statistical methods

SPSS 23.0 statistical software (IBM, USA) was used to analyze the statistical data. The measurement data were expressed as mean ± standard deviation ($\bar{x} \pm$ sd) and checked by t-test; the enumeration data were expressed as the number of cases/percentage (n/%) and verified by Chi Square test. If P< 0.05, the difference shall be considered statistically significant.

Results

Comparison of the general information

There were 34 males in the control group and 37 males in the observation group. The patients in the control group were 18 to 59 years old, with an average age of 47.3±22.6 years, while the patients in the observation group were 18 to 59 years old, with an average age of 45.8±27.5 years. BMI, fracture types, and underlying diseases were compared between the two groups, and there was no statistically significant difference (all P>0.05). For details, see **Table 1**.

Comparison of the pain level

The results showed that from the postoperative day two, the average pain level of the observation group was significantly lower than that of the control group (P<0.05). For details, see **Table 2**.

Therapeutic efficacy comparison

The patients in both groups obtained certain efficacy after treatment. In the control group, the average joint range of motion after treat-

Table 2. Comparison of pain levels ($\bar{x} \pm$ sd)

Group	Postoperative day 0	Postoperative day 1	Postoperative day 3	Postoperative day 5	Postoperative day 7
Control group (n=60)	45.23±12.43	34.60±5.05*	27.72±8.41*	19.69±7.83*	13.56±9.13*
Observation group (n=60)	44.69±8.52	30.83±7.39#	23.98±10.83#	15.20±11.23#	8.23±6.81#
t	0.278	3.263	2.113	2.540	3.625
P	0.781	0.001	0.037	0.012	0.001

Note: Compared with postoperative day 0 in control group, *P<0.05; compared with postoperative day 0 in observation group, #P<0.05.

Table 3. Comparison of therapeutic efficacy ($\bar{x} \pm$ sd, n (%))

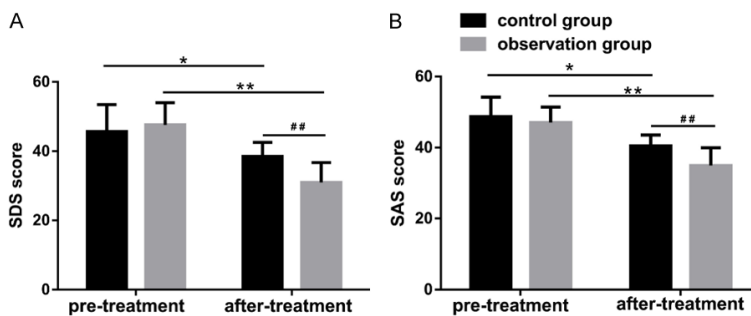| Group	Joint range of motion (°)	Average hospitalization time (day)	Cases of adverse reaction and complication
Control group (n=60)	125.23±18.94	6.24±1.03	16
Observation group (n=60)	143.67±12.59	5.21±0.92	6
χ^2/t	5.289	5.777	5.566
P	0.001	<0.001	0.032

Figure 1. Comparison of SDS scores and SAS scores. A. SDS scores; B. SAS score. Compared to pre-treatment within the same group, *P<0.05 and **P<0.01; compared with control group after treatment, ##P<0.01.

ment was 125.23±18.94, the cases of adverse reaction and complication were 16, and the average hospitalization time was 6.24±1.03 days; in the observation group, the average joint range of motion was 143.67±12.59, the cases of adverse reaction and complication were 6, and the average hospitalization time was 5.21±0.92 days. The results showed that the therapeutic efficacy of the observation group was significantly better than that of the control group (P<0.05). See **Table 3** for details.

Comparison of mental health status

The SDS and SAS scores of the patients in the two groups before and one month after nursing were compared, which showed that, before nursing, there was no significant difference in the SDS and SAS scores between the two groups (P>0.05); after nursing, the scores of

the two groups were both lower than those before nursing, but the decrease in the observation group was much greater than that in the control group, and the difference was statistically significant (P<0.05). For details, see **Figure 1**.

Comparison of nursing satisfaction and compliance

Before discharge, the patients evaluated the nursing of this treatment. The results showed that the satisfaction in the observation group was significantly higher than that in the control group (P<0.05). At the same time, the compliance of the two groups was evaluated, the results of which showed that the patients in the observation group had higher compliance. See **Tables 4** and **5** for details.

Discussion

Patients with orthopedic trauma can obtain good clinical effects mainly from two aspects: one is the perfect intraoperative manipulation and complete correction of deformity; the other is the high efficiency of functional rehabilitation after operation [15, 16]. Meanwhile, during postoperative rehabilitation, effective postoperative care can assist patients in carrying out functional exercise safely as soon as pos-

Table 4. Comparison of nursing satisfaction and compliance (n, %)

Group	Nursing satisfaction (case)			Satisfaction degree (n, %)
	Non-satisfaction	Average satisfaction	Satisfaction	
Control group (n=60)	13	35	12	37 (61.67)
Observation group (n=60)	4	29	27	56 (93.33)
χ^2				11.096
P				0.004

Table 5. Analysis of the medical order compliance

Group	Medical order compliance (case)			Compliance rate (n, %)
	Complete compliance	Partial compliance	Non-compliance	
Control group (n=60)	23	32	5	55 (91.67)
Observation group (n=60)	38	21	1	59 (98.33)
χ^2				8.638
P				0.013

sible, avoid postoperative complications, improve their comfort level of the diagnosis and treatment, and contribute to better postoperative recovery [17, 18].

This study also found that the SAS and SDS scores of orthopedic trauma patients who received high-quality nursing were significantly increased when compared with the scores before nursing or those who received traditional nursing. We believe this is due to the physiological and psychological care from the high-quality nursing, which attached great importance to the pain relief of the patients, conducted psychological comfort and counseling, and created a good and comfortable rehabilitation environment to improve their prognoses. During the postoperative care, severe pain will lead to some adverse symptoms, such as increased heart rate, increased blood pressure, and decreased sleep quality, which will seriously affect the prognosis of patients with hypertension and cardiovascular diseases [19, 20].

Lu et al. selected 100 orthopedic patients as the research objects and investigated the causes of postoperative pain [21]. According to the conditions of the patients, different postoperative pain nursing strategies were adopted. It was found that patients in the observation group who received targeted nursing for postoperative pain had shorter wound healing time and lower-level pain. In addition, Liu et al. studied 90 patients and found that pain manage-

ment nursing can benefit the patients more, with faster fracture healing and higher satisfaction [22]. This research found that the degree of postoperative pain in the observation group was lower than that in the control group, indicating that high-quality nursing can effectively reduce patients' degree of pain, which is beneficial to postoperative rehabilitation.

Zhang et al. chose 200 orthopedic trauma patients as the research objects, and different nursing methods were performed on two groups of patients [23]. The results showed that the joint range of motion, length of stay, and the incidence of complications of the patients who received high-quality nursing were significantly better than those of patients in the control group. The results of this research are consistent with the results of the above researches, indicating that the high-quality nursing service mode has a good clinical effect.

Zhou et al. observed 60 patients in orthopaedics perioperative period, and found that integrating humanistic care into perioperative pain management and strengthening psychological guidance can enhance patients' initiative to participate in pain management, improve their psychological state, enable them to face treatment more actively, thus optimizing their prognoses and improving their satisfaction with nursing [24]. This research, through the use of the psychological evaluation scale, found that after nursing, the observation group was significantly better than the control group in psycho-

logical status, satisfaction, and compliance, indicating that high-quality nursing can effectively improve the psychological status of patients, and reduce the degree of depression and anxiety.

But there are still inadequacies in this research: the sample size is small, which may lead to biased results, so we should increase the sample size for further research; this research was carried out at a single center, which may affect the universality of the results. In the future, we will consider incorporating the results of multicenter researches to obtain more accurate conclusions.

To sum up, the implementation of high-quality nursing for orthopedics trauma patients can effectively improve patients' conditions, help patients adjust their psychological state, reduce pain, and effectively improve the prognosis and recovery.

Disclosure of conflict of interest

None.

Address correspondence to: Sanlian Hu, Departments of Nursing, Shanghai Jiao Tong University Affiliated Sixth People's Hospital, No. 600 Yishan Road, Shanghai 200233, China. Tel: +86-021-64369181-58862; Fax: +86-021-64369181-58862; E-mail: husanliansh6h@163.com

References

[1]   New S, Hadi M, Pickering S, Robertson E, Morgan L, Griffin D, Collins G, Rivero-Arias O, Catchpole K and McCulloch P. Lean participative process improvement: outcomes and obstacles in trauma orthopaedics. PLoS One 2016; 11: e152360.

[2]   Zeng BF. Traumatic orthoaedic injury: the presence and future. Inj Med 2010; 33: 22-23.

[3]   Wang Y. The efficacy of pain nursing management model in orthopedic trauma. Heilongjiang Med Pharm 2017; 40: 153-154.

[4]   Li CM. Application of pain nursing management in orthopaedic trauma ward. Nursing of Integrated Traditional Chinese and Western Medicine 2016; 2: 107-108.

[5]   Mifsud M, Spiteri M, Camilleri K, Bonello M, Azzopardi T and Abela M. The orthopedic manifestations of congenital insensitivity to pain: a population-based study. Indian J Orthop 2019; 53: 665-673.

[6]   Yan L, Zhang XY and Chi L. Comparative study of professional psychological intervention on orthopaedic patients after the trauma. Nurs Pract Res 2011; 8: 121-122.

[7]   Gosselin MM, Alolabi B, Dickens JF, Li X, Mesfin A, Spraggs-Hughes A and Miller AN. Cross-sectional survey results on mental health among orthopedic surgery residents across North America. J Surg Educ 2019; 76: 1484-1491.

[8]   Fang Y, Wang N, Shi L, Barker T and Zhang P. Pain relief during wound care for patients with a deep open wound in an orthopedics trauma department: a best practice implementation project. JBI Database System Rev Implement Rep 2019; 17: 2559-2569.

[9]   Fu YH and Wang ZR. A retrospective pilot study of high-quality nursing care for cervical cancer. Medicine (Baltimore) 2018; 97: e12992.

[10]   Chen QR, Liu D, Bai Y, Ding JF and Tang SY. Experience of nursing managers in high quality nursing service: a qualitative study. Nursing Journal of Chinese People's Liberation Army 2016; 33: 52-55.

[11]   Li XQ. Effects of high-quality nursing care on psychological outcomes in patients with chronic heart failure. Medicine 2019; 98: e17351.

[12]   Wu L and Zhang L. Effect of high-quality nursing on improvement of anxiety and depression of patients with acute stroke in MRI examination. Iran J Public Health 2017; 46: 1646-1651.

[13]   Wang XF. The effect of nursing intervention on the trust degree of nursing patient relationship. Chinese Journal of Medical Device 2017; 30: 163-164.

[14]   Kushida K, Umemoto M, Negoro A, Nin T and Sakagami M. Clinical investigation using a self-rating depression scale in subjects with psychosomatic taste disorders. Nihon Jibiinkoka Gakkai Kaiho 2006; 109: 736-41.

[15]   Samakouri M, Bouhos G, Kadoglou M, Giantzelidou A, Tsolaki K and Livaditis M. Standardization of the Greek version of Zung's self-rating Anxiety Scale (SAS). Psychiatriki 2012; 23: 212-20.

[16]   Tsai YC, Lee HL, Kuo CC, Chen CY, Hsieh KL, Wu MH, Wen YC, Yu HW, Hsu FC, Tsai JT and Chiou JF. Prognostic and predictive factors for clinical and radiographic responses in patients with painful bone metastasis treated with magnetic resonance-guided focused ultrasound surgery. Int J Hyperthermia 2019; 36: 932-937.

[17]   Tenti S, Giordano N, Mondanelli N, Giannotti S, Maheu E and Fioravanti A. A retrospective observational study of glucosamine sulfate in addition to conventional therapy in hand osteoarthritis patients compared to conventional treatment alone. Aging Clin Exp Res 2019; [Epub ahead of print].

[18] Liu ML and Chen SY. Application effect of high quality nursing care in patients with simple rib fracture. China Health Standard Management 2017; 8: 169-171.

[19] Li G, Zhang G, Wang Y, Wang X, Zhou H, Li H and Chen L. The effect of whole body vibration on health-related quality of life in patients with chronic conditions: a systematic review. Qual Life Res 2019; 28: 2859-2870.

[20] Saccò M, Meschi M, Regolisti G, Detrenis S, Bianchi L, Bertorelli M, Pioli S, Magnano A, Spagnoli F, Giuri PG, Fiaccadori E and Caiazza A. The relationship between blood pressure and pain. J Clin Hypertens (Greenwich) 2013; 15: 600-5.

[21] Sharma UK, Dhungel K, Pokhrel D, Tamang S and Parajuli NP. Magnetic resonance imaging evaluation of musculoskeletal diseases of ankle and foot. Kathmandu Univ Med J (KUMJ) 2018; 16: 28-34.

[22] Lu M, Hu Y and Zhu HP. Analysis of the causes of postoperative pain in orthopedic patients and nursing strategies. Orthop Nurs 2019; 19: 354-5.

[23] Liu Y. Application value of pain nursing management model in orthopaedic trauma patients. Guide of China Medicine 2019; 17: 5-6.

[24] Zhou XH, Lin L and Zhao X. Application of humanistic care in perioperative pain management of orthopedic patients. J Nurs Train 2019; 34: 1330-1332.