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PDCA cycle management combined with detailed management of postoperative deep vein thrombosis in patients undergoing hip replacement surgery

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Abstract. – OBJECTIVE: This study aimed to analyze and explore the effect of Plan-Do-Check-Act (PDCA) cycle management combined with detailed management on postoperative deep venous thrombosis in patients undergoing hip replacement surgery.

PATIENTS AND METHODS: Patients who underwent hip replacement surgery in our hospital between November 2021 and April 2023 were recruited for the study. After screening, patients who met all the inclusion criteria were assessed for eligibility. Finally, 80 adults were enrolled. All patients were assigned into observation and control groups (1:1) according to the sequence of admission, i.e., patients admitted between November 2021 and August 2022 were the control group, and patients admitted between September 2022 and April 2023 were the observation group.

RESULTS: The intraoperative blood loss and hospital stay in the observation group were significantly less than those in the control group (p<0.05). After the intervention, the levels of plasma prothrombin time (PT), thrombin time (TT), and thromboplastin time (APTT) in the observation group were higher than those in the control group, and the DD level was lower than that in the control group (p<0.05). There was one patient in the observation group who developed deep venous thrombosis after the operation, and the incidence was 2.50%. The rate was significantly lower than that of the control group (p<0.05). The hip joint function score of the observation group was higher than that of the control group, and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scale score was lower than that of the control group (p<0.05). The incidence of adverse reactions in the observation group was significantly lower than that in the control group (p<0.05).

CONCLUSIONS: PDCA cycle management plus detailed management in patients with hip replacement surgery yields a favorable clinical outcome, which can effectively prevent postoperative deep vein thrombosis, and improve surgical indicators and postoperative coagulation function. Also, it reduces the incidence of adverse reactions in patients and facilitates recovery. It has a beneficial impact on the prognosis of patients and deserves promotion.

Key Words:
PDCA cycle management, Detailed management, Hip replacement, Deep vein thrombosis.

Introduction

With the aging of the population, hip joint disease has become one of the factors affecting people's healthy lives. Hip arthroplasty (HA) is the replacement of the femoral head and acetabulum of the human hip joint with an artificial hip prosthesis, which is now widely used in the treatment of necrosis of the femoral head, fracture of the neck of the femur, ankylosing spondylitis and other diseases[1,2]. However, emerging studies[3,4] have indicated that despite the increasing technological improvements in hip arthroplasty, it is associated with many postoperative complications, including joint dislocation, infection, bleeding, and venous thrombosis. Among them, deep vein thrombosis (DVT) is the major complication of hip replacement.

DVT is a venous reflux disease in which blood coagulates abnormally in deep veins, resulting in complete or incomplete occlusion of the venous lumen[5]. It is believed by many that with accelerated aging, the growth rate of artificial hip replacement would surge, and the patient's demand for post-replacement recovery and rehabilitation grow accordingly. This is because thrombosis, if not treated and cared for in a timely and effective manner, can affect the entire limb through retrograde expansion and, in severe cases, can lead to

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pulmonary embolism, which affects and threatens the patient's life and is one of the main causes of perioperative mortality today[6]. Overseas studies[2] have shown that even with effective prophylactic measures, the likelihood of postoperative DVT is still as high as 30-57%[7].

Traditional nursing concepts are no longer sufficient to adapt to the rapidly evolving healthcare landscape due to the continuous advancement of medical technology. Likewise, experience-based nursing models no longer suffice to meet the diverse healthcare needs of individuals. In this context, Plan-Do-Check-Act (PDCA) cycle management has emerged as a highly regarded management approach, with its components intricately connected in a spiral-like fashion, continually promoting the gradual enhancement of management quality. PDCA cycle management has found extensive application in the field of clinical nursing management, encompassing areas such as health education, medication safety, and functional exercise. Particularly in the care of postoperative patients, who often contend with physical trauma and prolonged activity limitations, negative emotions like anxiety and restlessness can surface, potentially diminishing their adherence to clinical treatments and severely impacting treatment outcomes[8]. The distinctive features of PDCA cycle management include its sustainability, systematic nature, and feedback mechanisms. This management methodology, through the iterative phases of planning (Plan), executing (Do), checking (Check), and taking action (Act), facilitates the continuous improvement of processes. Each phase is endowed with well-defined tasks and objectives, ensuring the effectiveness and efficiency of management. In clinical practice, PDCA cycle management has garnered widespread adoption. Taking health education as an example, healthcare institutions can formulate plans, conduct health education activities, assess educational outcomes, and, based on assessment results, take actions to enhance the quality and effectiveness of health education continually. Similarly, domains like medication safety and functional exercise can employ PDCA cycle management to elevate management standards and service quality.

To this end, the present study targeted PDCA cycle management with detailed management based on individual and common characteristics of patients to reduce the occurrence of postoperative deep vein thrombosis in hip arthroplasty patients.

Patients and Methods

Participants

This study was reviewed and granted by the Ethics Committee of our hospital. Patients who underwent hip replacement surgery in our hospital between November 2021 and April 2023 were recruited for the study. After screening, patients who met all the inclusion criteria were assessed for eligibility. Finally, 80 adults were enrolled. All patients were assigned into observation and control groups (1:1) according to the sequence of admission, i.e., patients admitted between November 2021 and August 2022 were the control group, and patients admitted between September 2022 and April 2023 were the observation group. All the patients and their families were aware of the study and provided the consent form.

Inclusion Criteria

Patients who were in line with the indications for surgery after examinations and had no treatment contraindications[9], patients who underwent hip replacement for the first time, patients with complete clinical data, with no restriction of gender, adult patients, patients with no recent use of antiplatelet and anticoagulant drugs were included in the study.

Exclusion Criteria

Patients with a history of thrombosis, autoimmune system disease or coagulation disorder, severe dysfunction of the heart, lung, liver, kidney, or malignant, etc. were excluded from the study.

Withdrawal Criteria

Patients who quit the study halfway, patients who lost follow-up period, or did not complete the study due to other reasons were assessed as withdrawal.

Procedures

Observation group

The observation group intervened with PDCA cycle management combined with detailed management. To analyze the influencing factors of postoperative deep vein thrombosis in hip arthroplasty patients, the Caprini scale was used to assess the risk of deep vein thrombosis, including age, BMI, high-risk diseases, and surgery, with a total score of 0-81 points. According to the scoring results, patients are divided into four levels: low risk (score 0-2 points), moderate risk (2-4

points), high risk (5-7 points), and extremely high risk (score ≥ 8 points). Then, a separate preoperative examination was performed, and the patient was informed about disease-related knowledge, surgical options, operating room environment, anesthesia methods, surgical location, surgical procedures, preoperative preparations, possible accidents, and the patient's mental status was assessed. Targeted interventions are carried out as follows. A) Psychological interventions. Assess the patient's malaise and distress before admission, discharge and post-discharge, and manage the patient according to the results of the assessment, including introduction of the patient's condition, surgical procedure, importance, necessity, safety and risk, as well as the skill of the surgeon and anesthesiologist, so as to make the patient feel more at ease with the surgical environment, and also introduce the general course of the surgery, including possible postoperative discomfort and solutions, as well as methods of recovery and relaxation in similar cases. B) Pain management. If the patient complains of pain or swelling in the affected limb, deep pressure pain in the gastrocnemius muscle with limitation of movement, and other abnormalities, the patient should seek medical attention promptly. C) Body position management. In the process of placing the limbs, both the requirements of surgical treatment and the need to promote venous return should be taken into account. The lower limbs should be appropriately elevated (20-30 cm above the heart plane) to keep the patient in a comfortable position. D) Cognitive and behavioral interventions. According to the plan, the importance and necessity of functional exercises for the patient may be explained in detail. After preoperative simulation training, patients are instructed to carry out rehabilitation training. During the training process, a combination of group explanation, movement demonstration, and individual guidance is used to teach each patient to master the whole process of simulation training, so as to lay a good foundation for early postoperative functional exercise; the rehabilitation program includes strength training, joint range of motion training, weight-bearing walking training, self-help training, and so on. E) Instrument check. One day before the surgery, check the surgical instruments and consumables one by one to see if they are complete, place the instruments in the designated location in the operating room, and test whether the instruments are working properly, checking each other's shortcomings and making up for them to ensure the accuracy and completeness of the surgical consumables and instruments. F) Family intervention. Harmonious family relationships can make patients feel happy and promote enthusiasm for functional exercises; health education on disease-related knowledge for family members, as well as behavioral interventions for patients, to improve their views on functional exercises; and distribution of rehabilitation plans to patients and their families after discharge from hospital. Family members guide and supervise the patient's functional exercise, require the patient to complete the designated functional exercise program, encourage and support the patient, follow up regularly, and answer the questions raised by the patient in a timely manner. Additionally, the refinement of management is performed, such as in the whole process of rehabilitation training, following the basic principles of individual treatment, step-by-step, comprehensive training. Rehabilitation programs are designed according to the patient's condition, age, and physical status, and are distributed to patients in the form of charts. In addition, the position of instruments during surgery should be convenient for the doctors' use and observation, and the station of the nurse in charge should be convenient for the transfer of instruments without affecting the operation. Detailed infection prevention is carried out in the operating theatre on a monthly basis, air bacterial culture tests are conducted on a regular basis, and surgeries are planned only when the bacterial count reaches a normal level, the laminar flow purification system is strictly sterilized, and switched on before the operation, the area is kept sterile and dry during the operation, and the entry of staff members into the operating theatre is controlled to prevent cross-infection. G) Diet management. During the postoperative recovery period, patients are advised to drink more water, eat more fresh fruits and vegetables, and pay attention to balanced nutrition. Through advanced inspection, departmental self-inspection, and theoretical inspection, the recovery of patients and their families is assessed according to the actual situation. If the patient has more negative emotions, timely consultation is needed to establish confidence in the recovery, regularly check the implementation of nurses' rehabilitation recommendations, assess the effect, and fully affirm the effective measures; sum up the successful experience, gradually implement the standardized implementation mode, determine

the common discussion and seek solutions to the problems, analyze the causes, identify the main influencing factors, formulate corresponding countermeasures, continuously improve the program, and transition to the next PDCA cycle plan. Then, the next PDCA cycle is planned.

Control group

The control group received routine nursing interventions, including adequate preoperative preparation, good preoperative instructions, routine health education, and a room temperature of around 25°C, humidity at around 55%, and routine sterilization, in order to help the surgeon determine the patient's body position during surgery. The surgical position is managed to ensure that the patient is in a comfortable and convenient position. Pay attention to the temperature of the patient's lower limbs during the operation, take necessary thermal insulation measures, and pay attention to the observation of the patient's blood pressure, pulse, respiration, and other vital signs. Strengthen the protection of the surgical site, prevent incision infection, take relevant measures to prevent deep vein thrombosis, postoperative rehabilitation guidance, routine anticoagulation and thrombolytic therapy, etc.

Outcomes

Surgical indices

The surgical indices of all patients were recorded, including operation time, intraoperative blood loss, and hospitalization time, etc., were compared and analyzed.

Coagulation function

5 ml of cubital venous blood was drawn from all patients in the morning before and after the intervention, and the plasma prothrombin time (PT), thrombin time (TT), D-dimer (DD) and thromboplastin time (APTT) were detected by automatic coagulation analyzer.

Deep vein thrombosis

The occurrence of deep venous thrombosis in all patients was recorded, and the incidence was calculated and compared.

Recovery effect

Hip function score and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scale were used to assess the recovery of patients after intervention.

Adverse reactions

The adverse reactions of all patients after the operation including bleeding, decubitus ulcer, pulmonary embolism, swelling of lower extremities, postoperative infection, and skin color change, were calculated and compared.

Statistical Analysis

Graphics were processed using GraphPad Prism 8 software; data were processed using SPSS 22.0 software (IBM Corp., Armonk, NY, USA). Count data [n (%)] and measurement data ±s were analyzed using the Chi-square test and t-test. $p<0.05$ was considered statistically significant.

Results

Baseline Characteristics

In the observation group, there were 11 males and 29 females, aged 33-84 years, average (71.63±11.71) years, disease duration 1-5 years, average (2.89±0.54) years, disease type: 16 cases of hip fracture, 7 cases of fracture of the neck of the femur, 17 cases of osteoarthritis of the hip joint. The control group consisted of 40 patients, 17 males and 23 females, aged 50 to 89 years, average (71.20±10.78) years, with a disease duration of 1 to 5 years, average (2.72±0.81) years. Disease types: 15 cases of hip fracture, 9 cases of fracture of the neck of the femur, and 16 cases of osteoarthritis of the hip joint. The two groups were well-balanced in terms of baseline characteristics ($p>0.05$) (Table I).

Surgical Indicators

The operation time of the observation group was insignificantly different from the corresponding indices of the control group ($p>0.05$), but the intraoperative blood loss and hospital stay in the observation group were significantly less than those in the control group ($p<0.05$) (Table II).

Coagulation

There was no significant difference in the coagulation function before the intervention ($p>0.05$). After the intervention, the levels of PT, TT, and APTT in the observation group were higher than those in the control group, and the DD level was lower than that in the control group ($p<0.05$) (Table III).

Table I. Baseline characteristics of the two groups of patients ($\bar{x} \pm s$).

		Observation group	Control group	χ^2/t	p
Number of cases	-	40	40	-	-
Gender	Male	11	17	1.978	0.160
	Female	29	23	-	-
Age	-	33-84	50-89	-	-
	Average	71.63 ± 11.71	71.20 ± 10.78	0.176	0.862
Disease duration (years)	-	1-5	1-5	-	-
	Average	2.89 ± 0.54	2.72 ± 0.81	1.104	0.273
Type	Hip fracture	16	15	0.052	0.820
	Femoral neck fracture	7	9	-	-
	Hip osteoarthritis	17	16	-	-
Type of surgery	total hip replacement	19	18	0.050	0.823
	Hemiarthroplasty	21	22	-	-
Smoking	Yes	19	20	0.050	0.823
	No	21	20	-	-
Drink wine	Yes	22	21	0.050	0.823
	No	18	19	-	-

Table II. Comparison of surgery-related indicators between the two groups of patients ($\bar{x} \pm s$).

	Observation group	Control group	t	p
Number of cases	40	40	-	-
Operation time (h)	1.51 ± 0.35	1.55 ± 0.34	0.518	0.606
Intraoperative blood loss (ml)	133.46 ± 24.16	201.65 ± 28.23	11.607	< 0.001
Length of hospital stay (d)	15.83 ± 5.20	21.78 ± 11.34	3.341	0.002

Table III. Comparison of coagulation function indexes before and after intervention in the two groups of patients ($\bar{x} \pm s$).

		Observation group	Control group	t	p
Number of cases	-	40	40	-	-
Before intervention	PT(s)	10.14 ± 1.12	10.24 ± 1.53	0.334	0.739
	TT(s)	16.15 ± 0.98	16.08 ± 1.04	0.310	0.757
	DD (mg/L)	0.42 ± 0.12	0.41 ± 0.21	0.261	0.795
	APTT(s)	30.12 ± 2.81	30.24 ± 2.45	0.204	0.839
After intervention	PT(s)	15.45 ± 1.53	11.15 ± 1.56	12.446	< 0.001
	TT(s)	15.98 ± 1.23	14.01 ± 1.01	7.829	< 0.001
	DD (mg/L)	1.01 ± 0.22	1.53 ± 0.23	10.333	< 0.001
	APTT(s)	29.81 ± 2.15	26.11 ± 2.17	7.661	< 0.001

Prothrombin time (PT), thrombin time (TT), D-dimer (DD), thromboplastin time (APTT).

Deep Vein Thrombosis

There was one patient in the observation group who developed deep venous thrombosis after the operation, and the incidence was 2.50%. The rate was significantly lower than that of the control group (p<0.05) (Table IV).

Table IV. Comparison of postoperative deep venous thrombosis incidence between the two groups (%).

	Observation group	Control group	χ^2	p
Number of cases	40	40	-	-
Number of cases	1	7	-	-
Incidence rate	2.50	17.50	5.000	0.025

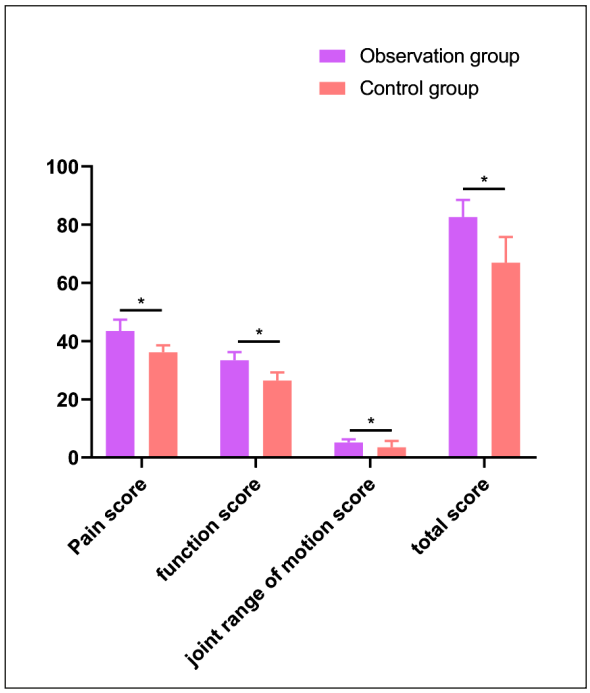

Figure 1. Comparison of hip joint function scores after intervention between the two groups. *Indicates a statistically significant difference between the two groups, $p < 0.05$.

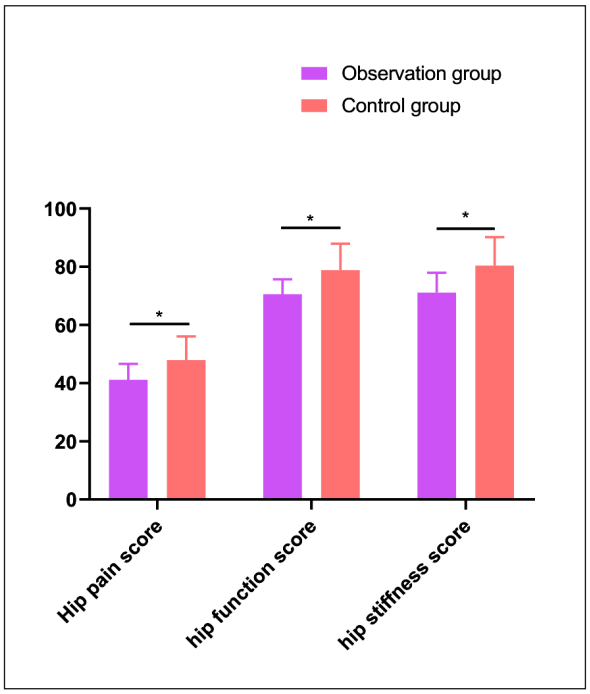

Figure 2. Comparison of WOMAC scale scores between the two groups of patients after intervention. *Indicates a statistically significant difference between the two groups, $p < 0.05$.

Recovery Outcomes

The hip joint function score of the observation group was higher than that of the control group, and the WOMAC scale score was lower than that of the control group ($p<0.05$) (Figures 1 and 2).

Adverse Reactions

The incidence of adverse reactions in the observation group was significantly lower than that in the control group ($p<0.05$) (Table V).

Discussion

Hip replacement surgery is now becoming increasingly popular in the treatment of hip disorders, femoral neck fractures, and other conditions. It is a more effective measure for treating serious fractures since it improves the function of the hip joint and shortens the treatment time[10]. It reduces the possibility of joint deformity, thus improving the quality of life of patients. However, hip replacement surgery is more traumatic, difficult to recover from, and prone to some postoperative complica-

Table V. Comparison of the incidence of adverse reactions between the two groups of patients (%).

	Observation group	Control group	χ^2	*p*
Number of cases	40	40	-	-
Bleeding	1	3	-	-
Bedsore	1	3	-	-
Pulmonary embolism	0	1	-	-
Lower extremity swelling	0	5	-	-
Postoperative infection	1	4	-	-
Skin color change	1	5	-	-
Incidence rate	10.00	52.50	16.815	< 0.001

tions and adverse reactions. If not effectively treated, it can easily cause pulmonary embolism, pain, and other symptoms, posing a greater threat to the patient's life safety[12,13]. Some studies[14] have shown that surgical patients often have negative emotions such as anxiety and fear, which lead to stress reactions during surgery and affect surgical outcomes.

This study mainly analyzed and investigated the effect of PDCA cycle management combined with detail management on postoperative deep vein thrombosis in hip arthroplasty patients. The results showed that the intraoperative blood loss and hospitalization time of the observation group were significantly less than those of the control group, and the hip joint function score of the observation group was higher than that of the control group. The hip joint function score of the observation group was higher than that of the control group, and the WOMAC scale score was lower than that of the control group. It is suggested that the application of PDCA cycle management combined with detailed management in patients with hip replacement surgery has a good clinical effect, can effectively improve the surgical indicators of patients, and has positive significance for the prognosis of patients. Through PDCA cycle management, patients are provided with postural care and guidance at different stages of the perioperative period, which reduces their preoperative psychological burden and keeps them in good condition during the operation[15]. Detailed care refers to the addition of more intimate care measures on the basis of routine care. The combination of the above two methods complements each other, and the effect is more significant. Personalized rehabilitation training is carried out after surgery, adhering to the principle of gradual and comprehensive training. Exercise prescriptions are designed according to the patient's condition, age, and physical condition. Issued to the corresponding patients in the form of charts and tables, so as to carry out more targeted rehabilitation training, patients have better functional recovery, more motivation, and can actively participate in social life, so as to improve the quality of life and improve the results.

This was also confirmed by the results of this study. Previous studies[16,17] have shown that intraoperative hypothermia in patients can increase the incidence of wound infection and cardiovascular disease, affect their coagulation function, and increase intraoperative bleeding; functional coagulation indexes can reflect the coagulation levels TT and APTT, and the D-dimer level can reflect the prothrombin and prothrombin activity. During postoperative traumatic stress, TT and APTT levels decrease, and D-dimer levels increase, suggesting that the body's coagulation function is hyperactive and prone to thrombus formation[16,17]. The results of this study showed that the PT, TT, and APTT levels of the observation group were higher than those of the control group, and the DD level was lower than that of the control group after the intervention[18-21]. The incidence of postoperative deep vein thrombosis in the observation group was significantly lower than that in the control group. The incidence of adverse reactions in patients in the observation group was significantly lower than that in the control group. It is suggested that PDCA cycle management combined with detail management can shorten the patient's fasting time and reduce hunger; preoperative dietary guidance can regulate gastrointestinal function; and psychological intervention can stabilize anxiety, thus reducing postoperative stress and excessive synthesis of coagulation factors, reducing the impact on blood flow[18]. In addition, early activity after waking up can promote blood circulation in the lower limbs and prevent obstruction of deep venous return, and early multimodal analgesia can reduce the activation of inflammatory factors, reduce the release of coagulation factors, or improve blood conditions, thus reducing thrombosis[19]. Through the combination of PDCA cycle management and detail management, the value of medical staff is reflected, knowledge is expanded, learning enthusiasm is significantly improved, and new knowledge of medical development is mastered in a timely manner; at the same time, it improves the patient's subjective initiative, enhances the awareness of self-protection, and actively cooperates with diagnosis, treatment and nursing care, promotes the recovery of the patient, strengthens the relationship between the medical caregiver and the patient, and improves the patient's satisfaction and the hospital's reputation[20,21].

Conclusions

PDCA cycle management plus detailed management in patients with hip replacement surgery yields a favorable clinical outcome, which can effectively prevent postoperative deep vein thrombosis, improve surgical indicators and postoperative coagulation function, reduce the incidence of adverse reactions in patients, and facilitate recovery. It has a beneficial impact on the prognosis of patients and deserves promotion.

Conflict of Interest
The authors declare that they have no conflict of interests.

Ethics Approval
The protocol was approved by the Ethics Committee of Lu'an People's Hospital of Anhui Province. Ethical No.: 957911.

Availability of Data and Materials
All data generated or analyzed during this study are included in this published article.

Authors' Contributions
Li Ma designed the research study and performed the research. Taotao Li conducted the experiments and analyzed the data. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

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References

1) Learmonth ID, Young C, Rorabeck C. The operation of the century: total hip replacement. Lancet 2007; 370: 1508-1519.
2) Grant L. My total hip replacement. Br J Sports Med 2021; 55: 459-460.
3) Galakatos GR. Direct Anterior Total Hip Arthroplasty. Mo Med 2018; 115: 537-541.
4) Gabbert T, Filson R, Bodden J, Coppola C. Summary: NAON's Best Practice Guideline, Total Hip Replacement (Arthroplasty). Orthop Nurs 2019; 38: 4-5.
5) Ortel TL, Neumann I, Ageno W, Beyth R, Clark NP, Cuker A, Hutten BA, Jaff MR, Manja V, Schulman S, Thurston C, Vedantham S, Verhamme P, Witt DM, D Florez I, Izcovich A, Nieuwlaat R, Ross S, J Schünemann H, Wiercioch W, Zhang Y, Zhang Y. American Society of Hematology 2020 guidelines for management of venous thromboembolism: treatment of deep vein thrombosis and pulmonary embolism. Blood Adv 2020; 4: 4693-4738.
6) Kruger PC, Eikelboom JW, Douketis JD, Hankey GJ. Deep vein thrombosis: update on diagnosis and management. Med J Aust 2019; 210: 516-524.
7) Cosmi B, Legnani C, Cini M, Tomba S, Migliaccio L, Borgese L, Sartori M, Palareti G. Thrombotic burden, D-dimer levels and complete compression ultrasound for diagnosis of acute symptomatic deep vein thrombosis of the lower limbs. Thromb Res 2022; 213: 163-169.
8) Rossi M, Tritapepe L, Conigliaro R, Fanti L, Monzani R, De Robertis E, Martino R, Pietrini L, Sbaraglia F, Pasquale L, Petrini F. Rethink analgo-sedation in digestive endoscopy: the role of scientific societies in tracing training path. Eur Rev Med Pharmacol Sci 2023; 27: 4670-4677.
9) Scott CEH, Clement ND, Davis ET, Haddad FS. Modern total hip arthroplasty: peak of perfection or room for improvement? Bone Joint J 2022; 104-B: 189-192.
10) Gulbrandsen TR, Muffly SA, Shamrock A, O'Reilly O, Bedard NA, Otero JE, Brown TS. Total Hip Arthroplasty: Direct Anterior Approach Versus Posterior Approach in the First Year of Practice. Iowa Orthop J 2022; 42: 127-136.
11) Lu M, Phillips D. Total Hip Arthroplasty for Posttraumatic Conditions. J Am Acad Orthop Surg 2019; 27: 275-285.
12) Morgan P. What's New in Hip Replacement. J Bone Joint Surg Am 2022; 104: 1599-1604.
13) Abdallah FW, McCartney CJL. Recommendations for total hip arthroplasty pain management: what's old, what's new and what continues to be missing? Anaesthesia 2021; 76: 1018-1020.
14) Vitola E, Buraka N, Erts R, Golubovska I, Miscuks A. Effect of different low doses of intrathecal morphine (0.1 and 0.2 mg) on pain and vital functions in patients undergoing total hip arthroplasty: a randomised controlled study. BMC Anesthesiol 2022; 22: 377.
15) Qiu H, Du W. Evaluation of the Effect of PDCA in Hospital Health Management. J Healthc Eng 2021; 2021: 6778045.
16) Kruger PC, Eikelboom JW, Douketis JD, Hankey GJ. Deep vein thrombosis: update on diagnosis and management. Med J Aust 2019; 210: 516-524.
17) Lin HY, Lin CY, Huang YC, Hsieh HN, Yang YW, Chang IL, Shen MC. Deep vein thrombosis after major orthopedic surgery in Taiwan: A prospective cross-sectional study and literature review. J Formos Med Assoc 2022; 121: 1541-1549.
18) Ashrafi M, Ahmad SB, Antoniou SA, Khan T, Antoniou GA. Treatment Strategies for Proximal Deep Vein Thrombosis: A Network Meta-analysis of Randomised Controlled Trials. Eur J Vasc Endovasc Surg 2022; 63: 323-334.
19) Mohamad H, Fronas SG, Jørgensen CT, Tavoly M, Garabet L, Ghanima W. The effect of rivaroxaban on the diagnostic value of D-dimer in patients with suspected deep vein thrombosis. Thromb Res 2022; 216: 22-24.
20) Lu MN, Zhang BL, Dai QH, Fu XH. Application of the Plan-Do-Check-Act Cycle in Shortening the Decision to Delivery Interval Time. Risk Manag Healthc Policy 2022; 15: 1315-1323.
21) Zeng F, Wang X, Gao Y, Hu L. Influence of Fine Management Combined With PDCA Cycle Method on Disinfection Qualified Rate and Performance Grade of Ophthalmic Precision Instruments. Front Surg 2022; 9: 856312.