

Original Article

Effect of high-quality care on limb function recovery and quality of life after osteoporotic hip fracture surgery in the elderly

Biyang Chen¹, Zhen Luo², Xiaolei Feng¹, Kaixia Pan¹, Qiuqin Liu¹, Yexiang Yang²¹Department of Orthopaedics, The Third Affiliated Hospital of Sun Yat-sen University, P.R. China;²Department of Joint and Trauma Surgery, The Third Affiliated Hospital of Sun Yat-sen University, P.R. China

Abstract

Objectives: To evaluate the effect of high-quality care on limb function recovery and quality of life (QOL) after osteoporotic hip fracture (OHF) surgery in the elderly. **Methods:** 116 elderly patients with OHF enrolled in our hospital from January 2017 to December 2019 were assigned into observation group (high-quality care, n=58) and control group (routine care, n=58). After one month of intervention, Harris Hip Score (HHS) and Barthel Index (BI) were used to evaluating limb function and self-care ability, pain intensity numerical rating scale (PINRS) for pain assessment, self-rating anxiety scale (SAS), and self-rating depression scale (SDS) for emotion assessment. Besides, postsurgical complications, QOL and patient satisfaction were examined. **Results:** HHS and BI were higher in observation group ($P<0.05$); PINRS, SAS and SDS were lower in observation group ($P<0.05$); incidence of postsurgical complications in the observation group was significantly lower than that in the control group ($P<0.05$); QOL and patient satisfaction in the observation group were higher than those in the control group ($P<0.05$). **Conclusion:** High-quality care promotes the recovery of limb function, the QOL and the satisfaction of elderly patients.

Keywords: High-Quality Care, Hip Fracture, Limb Function Recovery, Quality Of Life

Introduction

Osteoporosis (OP) is an aging-related bone disease common in the elderly¹ that is associated with bone pain or fracture and seriously decreases the quality of life (QOL)². Hip fracture causes disability, psychological distress and medical expenses, imposing a heavy burden to society and patient's family^{3,4}. Surgical treatment is an effective measure to treat senile osteoporotic hip fracture (OHF), which effectively saves patients' lives and prevents complications⁵. However, postsurgical recovery of many patients remains

disappointing, so seeking an effective nursing mode is of great urgency.

Following the continuous development of modern nursing, high-quality care, a new model with humanistic care, has been proposed in clinical practice⁶. It aims to provide high-quality nursing services to increase the satisfaction of patients. Moreover, with the popularization of modern nursing concepts, high-quality care values are gradually reflected⁷. For example, there is evidence that high-quality care buffers negative emotions and shortens the recovery time of patients undergoing gynecological laparoscopic surgery⁸. Besides, high-quality care reduces the pressure of surgical patients and relieves their negative emotions, and decreases postoperative complications⁹. Both studies indicate the high value of high-quality care in the past clinical practice. However, there are relatively few reports on its application in the postsurgical recovery of elderly patients with OHF.

Therefore, this study explores the role of high-quality care in postsurgical recovery and QOL of elderly patients with OHF, to develop a higher quality scheme for postsurgical care.

The authors have no conflict of interest.

Corresponding author: Yexiang Yang, Department of Joint and Trauma Surgery, The Third Affiliated Hospital of Sun Yat-sen University, No.600 Tianhe Road, Tianhe District, Guangzhou 510630, Guangdong Province, P.R. China
E-mail: xtprj9@163.com

Edited by: G. Lyritis

Accepted 31 August 2021



Materials and methods

Clinical data

A total of 116 elderly patients who underwent OHF surgery in the Third Affiliated Hospital of Sun Yat-sen University from January 2017 to December 2019 were included. Fifty-eight patients treated with routine nursing measures during perisurgical period were allocated into control group, and fifty-eight patients treated with high-quality care were allocated into observation group. Inclusion criteria: patients who had surgery for hip fracture and signed the informed consent form. Exclusion criteria: patients with pathological fractures induced by osteomyelitis or other bone tumors; patients with severe liver and kidney dysfunction, serious complications, severe coagulation disorders, or communication difficulties, as well as those who did not cooperate with the procedures. This study was approved by the Third Affiliated Hospital of Sun Yat-sen University Ethics Committee (No. Gz2017013648).

Nursing procedures

Patients in control group received routine nursing care: Nurses strictly observed patients' conditions, timely solved postoperative abnormalities, and carried out health knowledge education on hip fracture and routine nursing care of functional exercise.

Patients in intervention group received high-quality care:

1) Health education: health education and propaganda were given to the patients and their families to introduce the structure of hip joint, the concept and causes of hip fracture, as well as considerations after hip fracture and surgery, postsurgical recovery, protection of hip joint, and functional exercise so that the patients had a complete understanding of the disease. 2) Psychological intervention: Nurses introduced successful cases to patients to improve their treatment confidence. Patients' negative emotions were timely relieved and mitigated. Nurses encouraged family members to participate in the postoperative recovery process and motivated patients to adhere to functional recovery. 3) Functional exercise guidance: The purpose and method of functional exercise were explained to patients after surgery, along with the correct way of hip protection. Isometric muscle contraction of quadriceps and iliopsoas muscle was performed in the early stage, and hip abduction training and supine straight-leg raising exercise were carried out in the later stage. Patients were instructed to exercise all joints by hip and knee flexion (supine) except the affected limb. Patients also took weight-bearing and walking training, including lifting, pulling, and walking with unaffected limbs and hands, standing balance training, walker-assisted walking training, single-footed-assisted walking training and full-weight-bearing walking training. Besides, self-care ability training and functional training of changing postures (lying-sitting-standing), walking up-and-down stairs, wearing pants, shoes and socks, going to the toilet, were integrated into patients' daily life. 4) Observation of disease condition: Nurses closely observed patients' state during functional exercise. Exercise should be stopped immediately upon the

appearance of pain; nurses checked the disease condition and reported it to the attending doctor in time, thereby making corresponding treatment. 5) Dietary guidance: Light and digestible foods such as vegetables and fruit, as well as foods promoting blood circulation and removing blood stasis, were recommended before surgery, which was helpful to relieve pain. After surgery, foods with the functions of invigorating qi and blood and strengthening tendons and bones were suggested. 6) Anti-infection nursing care: Instruments and appliances were kept clean to avoid cross-infection. Moreover, timely wound care was performed to avoid inflammation. 7) Prevention and intervention management: Nurses monitored the vital signs of patients, focusing on local swelling and limb peripheral circulation. Infusion speed was controlled, and volume of drainage and wound exudation was recorded. Affected limbs were placed in neutral and in abduction as far as possible to avoid adduction or pronation. 8) Out-of-hospital care: Regular telephone or on-site follow-ups were made to develop reasonable adjustment of exercise plan and diet arrangement to eliminate hidden dangers.

Outcome measures

Harris Hip Score (HHS)¹⁰ was used to score hip joint function before nursing and after one month of nursing. Hip joint deformity and pain, joint activity and function were evaluated, with a total score of 100, 90-100 as excellent, 80-89 as good, 70-79 points as fair, and less than 70 points as poor.

Barthel index (BI)¹¹ was used to evaluate the independent living ability of patients before nursing and after one month of nursing. Taking 10 daily activities as indicators, the total score was 100. Patients scored 60 or above were considered to be able to live independently, those scored 41-59 were considered to have certain independent living ability but need help from others, and those scored less than 40 were considered to lose their independent living ability.

Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS)¹² were employed to evaluate negative emotions of patients before nursing and after one month of nursing.

Pain intensity numerical rating scale (PINRS)¹³ was used for pain assessment. 10 indicated severe and unbearable pain, 7-9 indicated severe but tolerable pain, 4-6 indicated moderate pain, 1-3 points indicated mild pain, 0 indicated no pain. After intervention, a decrease in pain score of more than 4 points was considered as obvious improvement, 2-4 points as moderate improvement, and 2 points as no improvement.

Complications of hospitalized patients were recorded, including abdominal distension, urine retention, fever and pulmonary infection.

Quality of Life-Liver Cancer (QOL-LC) scale¹⁴ was adopted to evaluate patients' QOL when discharged from hospital. The scale included five dimensions: physical functioning, role functioning, emotional functioning, cognitive functioning and social functioning. Higher the score indicated better QOL.

A questionnaire was developed to assess patient satisfaction with nursing care, which was graded as highly satisfied, satisfied and dissatisfied.

Table 1. General data.

Parameters	Observation group (n=58) n (%)	Control group (n=58) n (%)	χ^2	P
Sex			0.142	0.706
Male	33(56.90)	35(60.34)		
Female	25(43.10)	23(39.66)		
Age (years)			0.035	0.851
≤65	24(41.38)	25(43.10)		
>65	34(58.62)	33(56.90)		
BMI (kg/m²)			0.035	0.853
≤23	28(48.28)	27(46.55)		
>23	30(51.72)	31(53.45)		
History of smoking			0.035	0.853
Yes	31(53.45)	30(51.72)		
No	27(46.55)	28(48.28)		
History of drinking			0.147	0.702
Yes	21(36.21)	23(39.66)		
No	37(63.79)	35(60.34)		
Type of surgery			0.035	0.852
Internal fixation	27(46.55)	26(44.83)		
Total hip replacement	31(53.45)	32(55.17)		

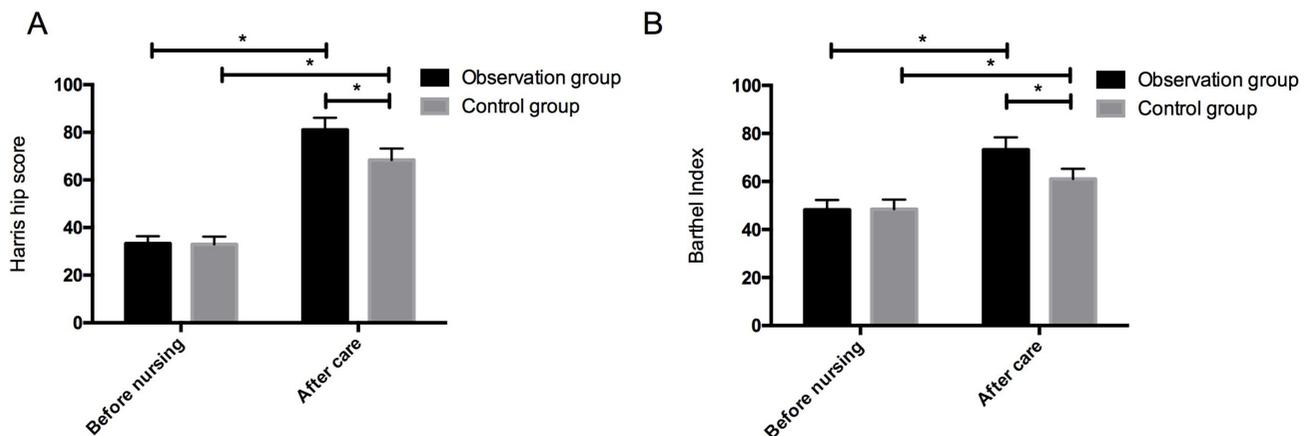


Figure 1. Comparison of HHS and BI. A. Comparison of HHS between the two groups before nursing and after 1 month of nursing; B. Comparison of BI between the two groups before and after 1 month of nursing. *P<0.05.

Statistical methods

SPSS 19.0 statistical software (Beijing NDTimes Science and Technology Co., Ltd.) was employed for data processing. The measurement data were represented with mean±standard deviation, and between-group comparison was performed with t-test. Chi-square test was used for the comparison of the counting data. P<0.05 indicated that the difference was statistically significant.

Results

General data

The average age of the 116 participants (68 males and 48 females) was 65.72±5.22 years. There was no significant difference in sex, age, body mass index (BMI) and type of surgery between the two groups (P>0.05), indicating a comparability (Table 1).

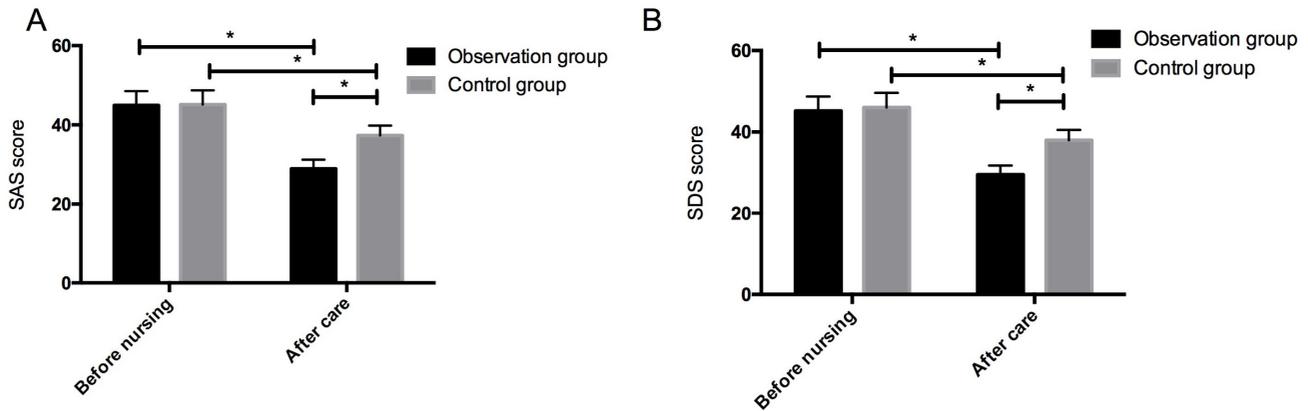


Figure 2. Comparison of negative emotions. A. Comparison of SAS between the two groups before nursing and after 1 month of nursing; B. Comparison of SDS between the two groups before and after one month of nursing. *P<0.05.

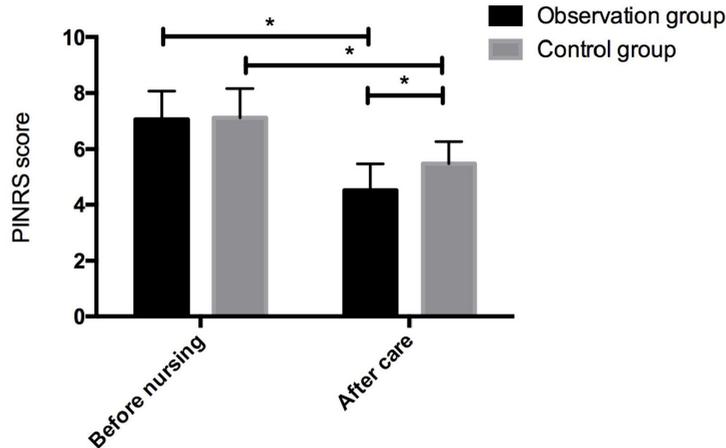


Figure 3. Comparison of PINRS scores. There is no significant difference in PINRS scores between the two groups before nursing, but after 1 month of nursing, the scores in observation group decrease evidently. *P<0.05.

Comparison of HHS and BI

HHS and BI were used to evaluate the hip joint function and independent living ability of patients before nursing and after 1 month of nursing. It turned out that there was no significant difference between the two groups before nursing ($P>0.05$), and they increased evidently after nursing. Still, the increase in observation group was more significant than that in control group ($P<0.05$) (Figure 1).

Comparison of negative emotions

SAS and SDS were adopted to evaluate the negative emotions of patients before nursing and after 1 month of nursing. The results revealed that there was no significant difference before nursing ($P>0.05$). The negative emotions were remarkably alleviated in the two groups after nursing, but the alleviation in observation group was more significant than that in control group ($P<0.05$) (Figure 2).

Comparison of PINRS scores

This study used PINRS for pain assessment. The PINRS scores in observation group before nursing and after 1 month of nursing were (7.05 ± 1.02) and (4.52 ± 0.95) , respectively, and those in the control group were (7.11 ± 1.05) and (5.48 ± 0.79) . There was no significant difference in PINRS scores between the two groups before nursing, but after 1 month of nursing, the scores in observation group decreased evidently ($P<0.05$) (Figure 3).

Comparison of complications of hospitalized patients

The cases of abdominal distension, urinary retention, fever and pulmonary infection in observation group were 1, 0, 2 and 1, respectively, with a complication rate of 6.90%. In contrast, those in control group were 3, 2, 4, and 3, respectively, with a complication rate of 20.69%. The observation group had lower incidence of complications than the control group ($P<0.05$), Table 2.

Table 2. Comparison of incidence of complications.

Complication	Observation group (n=58) n (%)	Control group (n=58) n (%)	χ^2	P
Abdominal distension	1(1.72)	3(5.17)	-	-
Urine retention	0	2(3.45)	-	-
Fever	2(3.45)	4(6.90)	-	-
Pulmonary infection	1(1.72)	3(5.17)	-	-
Total incidence	4(6.90)	12(20.69)	4.640	0.031

Table 3. Comparison of QOL one month after discharge.

Dimension	Observation group (n=58) n (%)	Control group (n=58) n (%)	t	P
Role functioning	81.33±2.35	66.71±2.29	33.93	<0.001
Emotional functioning	80.97±2.41	68.26±2.31	29.00	<0.001
Physical functioning	81.84±2.53	67.33±2.43	31.50	<0.001
Cognitive functioning	80.11±3.02	65.75±2.32	28.72	<0.001
Social functioning	80.86±2.63	66.93±2.52	29.13	<0.001

Table 4. Comparison of patient satisfaction on nursing care [n (%)].

Group	Observation group n=58 n (%)	Control group n=58 n (%)	χ^2	P
Patient satisfaction	56(96.55)	45(77.59)	9.265	0.002
Highly satisfied	41(70.69)	22(37.93)	-	-
Satisfied	15(25.86)	23(39.66)	-	-
Dissatisfied	2(3.45)	13(22.41)	-	-

Evaluation of QOL one month after discharge

Scores of role functioning, emotional functioning, physical function, cognitive functioning and social functioning in observation group were higher than those in control group (81.33±2.35 vs. 66.71±2.29, 80.97±2.41 vs. 68.26±2.31, 81.84±2.53 vs. 67.33±2.43, 80.11±3.02 vs. 65.75±2.32, 80.86±2.63 vs. 66.93±2.52). Therefore, the QOL in observation group was higher than that in control group ($P<0.05$), as shown in Table 3.

Comparison of patient satisfaction on nursing care

In observation group, 41 patients were highly satisfied with the care, 15 were satisfied and 2 were dissatisfied, and the satisfaction rate was 96.55%. Whereas in control group, the cases were 22, 23 and 13, respectively, with a satisfaction rate of 77.59%. Patients in observation had higher satisfaction than those in control group ($P<0.05$), as shown in Table 4.

Discussion

Surgery remains the primary treatment for elderly patients with OHF, aiming to restore hip joint's function¹⁵. However, due to cognitive deviation and older bone age of the elderly, postoperative recovery is slowed down and clinical requirements for postoperative care become higher¹⁶. As a detailed and standardized routine care with psychological care throughout the whole process¹⁷, high-quality care effectively alleviates the negative emotions and improves patients' satisfaction^{18,19}. However, little is known about the role of high-quality care in elderly patients after OHF surgery.

Therefore, we explored the application of high-quality care in elderly patients with OHF to find a suitable nursing scheme for them. It turned out that after one month of high-quality care focusing on functional exercise and psychological counseling, the hip function and independent living ability of the patients were restored significantly. This suggests that high-quality care effectively improves the prognosis

of patients after OHF surgery. For elderly patients with OHF, recovery is slow, so long-term bed rest after surgery may lead to muscle atrophy and limited joint motion. Early functional exercise better copes with these difficulties. It promotes bone hematoma and prevents joint adhesion and strengthens muscle strength, thereby accelerating recovery of limb function and self-care ability. There is evidence that elderly hip fracture patients treated with early intervention of high-intensity functional exercise presented significantly better recovery than those in control group²⁰. However, in this study, high-intensity exercise led many patients to drop out of the trial. Therefore, a step-by-step functional exercise plan was adopted, which gradually guided patients to carry out rehabilitation training.

Pain is one of the most common symptoms of elderly patients after OHF surgery. Tissue trauma caused by surgery makes patients more sensitive to pain, which brings physical pain and anxiety, depression, and other adverse emotions, resulting in patients refusing rehabilitation training due to their fear of functional exercise²¹. However, after implementing high-quality care cored by functional exercise and psychological counseling, we noticed that patients' hip pain was improved, and the negative emotions were relieved. In the nursing process, we took a series of measures to relieve the pain and paid great attention to patients' psychological state to alleviate their negative emotions better. A study reveals that high-quality care effectively reduces the pain and promotes the postoperative recovery of fracture patients²², similar to our results. The "people-oriented" concept of high-quality care requires all nursing work of nurses to be patient-centered²³, and optimized nursing services contribute to the promotion of postoperative recovery. Our findings also showed that high-quality care reduced the incidence of postsurgical complications. The occurrence of postsurgical complications of hip fracture patients can slow down the recovery and may cause new injuries to patients²⁴, so reducing complications is also one reason for promoting the recovery of patients after surgery. The increased QOL and satisfaction of patients in this study indicated the significant effect of high-quality care in elderly patients after OHF surgery.

To sum up, high-quality care promotes the recovery of limb function, the QOL, and the satisfaction of elderly patients with OHF in a systematic, humanized, and comprehensive manner, which is worthy of clinical promotion and application.

Authors' contributions

BC designed the study and drafted the manuscript. ZL and XF were responsible for the collection and analysis of the experimental data. KP, QL and YY revised the manuscript critically for important intellectual content. All authors read and approved the final manuscript.

References

- Christiansen BA, Harrison SL, Fink HA, et al. Incident fracture is associated with a period of accelerated loss of hip BMD: the Study of Osteoporotic Fractures. *Osteoporos Int* 2018;29:2201-2209.
- Weycker D, Edelsberg J, Barron R, et al. Predictors of near-term fracture in osteoporotic women aged ≥ 65 years, based on data from the study of osteoporotic fractures. *Osteoporos Int* 2017;28:2565-2571.
- Moriwaki K, Noto S. Economic evaluation of osteoporosis liaison service for secondary fracture prevention in postmenopausal osteoporosis patients with previous hip fracture in Japan. *Osteoporos Int* 2017;28:621-632.
- Wang Pei-Wen, Li Yi-Zhong, Zhuang Hua-Feng, et al. Anti-Osteoporosis Medications Associated with Decreased Mortality after Hip Fracture. *Orthop Surg* 2019;11:777-783.
- Wang P, Li Y, Zhuang H, et al. Influence of bone densitometry on the anti-osteoporosis treatment after fragility hip fracture. *Aging Clin Exp Res* 2019; 31:1525-1529.
- Lattof Samantha R, Maliqi Blerta. Private sector delivery of quality care for maternal, newborn and child health in low-income and middle-income countries: a mixed-methods systematic review protocol. *BMJ Open* 2020; 10:e033141.
- Kristensen PK, Sogaard R, Thillemann TM, et al. High quality of care did not imply increased hospital spending-nationwide cohort study among hip fracture patients. *Int J Qual Health Care* 2019;31:22-29.
- Jun K, Lopez J. Perioperative care management for the patient undergoing gynecologic laparoscopy. *Semin Perioper Nurs* 1993;2:159-165.
- Wu Qi, Huang LH, Xing MY, et al. Establishing nursing-sensitive quality indicators for the operating room: A cross-sectional Delphi survey conducted in China. *Aust Crit Care* 2017;30:44-52.
- Fulin P, Pokorny D, Hert J, et al. Results of 198 primary total hip arthroplasties using the Delta PF-FIT system with ceramic-on-ceramic articulating surfaces with average seven years follow up. *BMC Musculoskelet Disord* 2020;21:311.
- Knauf T, Buecking B, Hack J, et al. Development of the Barthel Index 5 years after hip fracture: Results of a prospective study. *Geriatr Gerontol Int* 2019;19:809-814.
- Yue T, Li Q, Wang R, et al. Comparison of Hospital Anxiety and Depression Scale (HADS) and Zung Self-Rating Anxiety/Depression Scale (SAS/SDS) in Evaluating Anxiety and Depression in Patients with Psoriatic Arthritis. *Dermatology (Basel)* 2020;236:170-178.
- Suzuki H, Aono S, Inoue S, et al. Clinically significant changes in pain along the Pain Intensity Numerical Rating Scale in patients with chronic low back pain. *PLoS ONE* 2020;15:e0229228.
- Wan C, Fang J, Yang Z, et al. Development and validation of a quality of life instrument for patients with liver cancer QOL-LC. *Am J Clin Oncol* 2010;33:448-455.
- Frederiksen A, Abrahamsen B, Johansen PB et al.

- Danish, national cross-sectional observational study on the prevalence of prior major osteoporotic fractures in adults presenting with hip fracture-limitations and scope for fracture liaison services in prevention of hip fracture. *Osteoporos Int* 2018;29:109-114.
16. Makridis K G, Karachalios T, Kontogeorgakos V A, et al. The effect of osteoporotic treatment on the functional outcome, re-fracture rate, quality of life and mortality in patients with hip fractures: a prospective functional and clinical outcome study on 520 patients. *Injury* 2015; 46:378-83.
 17. Giltenane M, Frazer K, Sheridan A. Evaluating the impact of a quality care-metric on public health nursing practice: protocol for a mixed methods study. *J Adv Nurs* 2016; 72:1935-1947.
 18. Foley RN, Parfrey PS, Sarnak MJ. Epidemiology of cardiovascular disease in chronic renal disease. *Am Soc Nephrol* 2013;9:S16-S23.
 19. Malyszko J. Mechanism of endothelial dysfunction in chronic kidney disease. *Clin Chim Acta* 2010;411:1412.
 20. Briggs RA, Houck JR, LaStayo PC et al. High-Intensity Multimodal Resistance Training Improves Muscle Function, Symmetry during a Sit-to-Stand Task, and Physical Function Following Hip Fracture. *J Nutr Health Aging* 2018;22:431-438.
 21. Schottel PC. Better Late Than Never, but Is Early Best?: Commentary on an article by John M. Garlich, MD, MHDS, et al., "Time to Block: Early Regional Anesthesia Improves Pain Control in Geriatric Hip Fractures". *J Bone Joint Surg Am* 2020;102:e45.
 22. Leland NE, Lepore M, Wong C, et al. Delivering high quality hip fracture rehabilitation: the perspective of occupational and physical therapy practitioners. *Disabil Rehabil* 2018;40:646-654.
 23. Symon A, McFadden A, White M, et al. Using a quality care framework to evaluate user and provider experiences of maternity care: A comparative study. *Midwifery* 2019; 73:17-25.
 24. Cobden A, Cobden SB, Camurcu Y, et al. Effects of postoperative osteoporosis treatment on subsequent fracture and the 5-year survival rates after hemiarthroplasty for hip fracture. *Arch Osteoporos* 2019;14:100.