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Research on the Application of WeChat Platform-Based Flipped Classroom Health Education in Osteoporotic Vertebral Compression Fractures

Youmei Tan*, Jianzhen Chen, Yongbing Meng, Liying Gong, Simin Wu, Zhaoping Lai, Chunhua Wan, Huabao Ye#

Department of Orthopedic Surgery, People's Hospital of Luchuan, Yulin, China
Email: *623083540@qq.com, #1745112556@qq.com

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Abstract

Objective: To investigate the effects of the flipped classroom health education model based on the WeChat platform on disease knowledge mastery, adherence to anti-osteoporosis treatment, and the incidence of re-fracture in patients with osteoporotic vertebral compression fractures (OVCF) undergoing percutaneous vertebroplasty (PVP). **Methods:** A total of 100 OVCF patients who received PVP treatment in our hospital from January 2022 to June 2023 were selected and randomly divided into a control group (conventional health education) and an observation group (WeChat platform-based flipped classroom health education), with 50 cases in each group. Disease knowledge scores, adherence to anti-osteoporosis medication (assessed using the Morisky Medication Adherence Scale-8, MMAS-8), re-fracture incidence, and nursing satisfaction were compared between the two groups at 1, 3, 6, and 12 months postoperatively. **Results:** At each postoperative time point, the observation group showed significantly higher levels of disease knowledge mastery and treatment adherence than the control group ($P < 0.05$). During the 12-month follow-up, the re-fracture rate in the observation group was 4.0% (2/50), which was significantly lower than that in the control group (16.0%, 8/50; $P < 0.05$). The total NSNS score in the observation group was (85.2 ± 8.6) points, which was higher than that in the control group (72.5 ± 10.3) points, and the difference was statistically significant ($P < 0.001$). **Conclusion:** The flipped classroom health education model based on the WeChat platform can effectively improve disease cognition and adherence to anti-osteoporosis treatment in

*Co-first author.
#Corresponding author.

OVCF patients, thereby reducing the risk of re-fracture. It is worthy of clinical application and promotion.

Keywords

WeChat Platform, Flipped Classroom, Health Education, Osteoporotic Vertebral Compression Fracture, Percutaneous Vertebroplasty, Treatment Adherence

1. Introduction

Osteoporotic vertebral compression fracture (OVCF) is the most common serious complication of osteoporosis. It predominantly affects the elderly population and can lead to intractable back pain, spinal deformity, reduced mobility, and significantly increased risks of re-fracture and mortality [1] [2]. Percutaneous vertebroplasty (PVP), with its advantages of minimal invasiveness, rapid pain relief, and vertebral stabilization, has become an important treatment for OVCF [3] [4]. However, PVP only addresses local vertebral mechanical issues and does not alter the patient's systemic metabolic state of osteoporosis. Without effective postoperative anti-osteoporosis treatment and health behavior management, the risk of re-fracture remains high [5].

Health education is a key component in improving patients' disease awareness, promoting treatment adherence, and preventing re-fractures [6]. Traditional health education often relies on oral explanations, brochures, group lectures, etc., which have limitations such as monotonous content, fixed schedules, low patient engagement, and insufficient continuity of care after discharge [7]. In recent years, the "flipped classroom"—an innovative teaching model that shifts the learning initiative from teachers to students through pre-class self-study and in-class interactive discussions—has emerged [8]. Introducing the flipped classroom concept into patient health education, combined with the wide coverage, strong interactivity, and anytime-anywhere accessibility of the WeChat platform, may overcome the spatial and temporal constraints of traditional education and improve educational outcomes.

To date, research on the application of the WeChat platform-based flipped classroom health education in OVCF patients remains limited. This randomized controlled trial aims to evaluate the effects of this model on postoperative disease knowledge mastery, adherence to anti-osteoporosis treatment, and the incidence of re-fracture in OVCF patients, so as to provide evidence-based support for clinical nursing health education.

2. Materials and Methods

2.1. General Data

A total of 100 OVCF patients who underwent PVP treatment in the Department of Spinal Surgery of our hospital from January 2022 to June 2023 were selected. Inclu-

sion criteria: 1) meeting the diagnostic criteria of the *Guidelines for the Diagnosis and Treatment of Osteoporotic Vertebral Compression Fractures* and confirmed by X-ray, CT, or MRI as having a single-level OVCF; 2) age ≥ 50 years; 3) undergoing first-time PVP surgery with a successful procedure; 4) the patient or a family member owns a WeChat account and is proficient in using a smartphone; 5) informed consent obtained and voluntary participation in this study. Exclusion criteria: 1) pathological fractures (due to tumor, infection, etc.); 2) concomitant severe cardiac, cerebral, pulmonary, hepatic, or renal diseases, or cognitive dysfunction; 3) previous receipt of systematic osteoporosis health education; 4) death or loss to follow-up due to other serious diseases during the follow-up period.

The 100 patients were randomly divided into a control group and an observation group using a random number table method, with 50 cases in each group. Comparisons of baseline data between the two groups, including sex, age, fracture level, bone mineral density T-score, and preoperative Visual Analogue Scale (VAS) pain score, showed no statistically significant differences ($P > 0.05$), indicating comparability. The study protocol was approved by the Medical Ethics Committee of our hospital (Approval No. 20240522004), and all patients signed the informed consent form. See Table 1.

Table 1. Comparison of baseline data between the two groups.

Tem	Control group (n = 50)	Observation group (n = 50)	P value
Gender (male/female)	18/32	16/34	>0.05
Age (years)	68.4 ± 7.2	69.1 ± 6.8	>0.05
Fracture level (T11-L2)	42 (84%)	44 (88%)	>0.05
Bone mineral density T-score (BMD T-score)	−3.1 ± 0.5	−3.0 ± 0.6	>0.05
Preoperative VAS score	7.2 ± 1.1	7.3 ± 1.0	>0.05

In this study, a random number table method was used to generate the random allocation sequence. An independent researcher who was not involved in clinical care or outcome assessment generated the sequence and assigned patients to the control group or observation group in a 1:1 ratio, without using blocking or stratification. To implement allocation concealment, the random allocation results were sequentially placed into opaque, sealed envelopes numbered in order, with only the serial number marked on the outside and no group information revealed. When a patient was enrolled, another researcher who was not involved in the generation of the random sequence opened the envelope and informed the patient of the group assignment. The allocation sequence remained concealed from all researchers until the envelopes were opened. Due to the nature of the health education intervention, blinding of patients and the nurses delivering the health education was not feasible in this study. However, outcome assessors (including the scorers of the disease knowledge questionnaire, the two radiologists who inde-

pendently read the imaging for re-fracture, and the data statistical analysts) were blinded to patient group allocation. Imaging assessment was performed independently by two radiologists, and any disagreement was resolved through discussion to reach a consensus. During the reading process, they only had access to the imaging codes and were not informed of the patients' group assignment.

Postoperative anti-osteoporosis treatment regimen: In both groups, the attending spinal surgeons formulated a standardized anti-osteoporosis regimen based on the *Guidelines for the Diagnosis and Treatment of Primary Osteoporosis* and individual patient factors including bone mineral density, renal function, and vitamin D levels. The baseline regimen consisted of Calcium Carbonate D_3 Tablets (Caltrate D, containing elemental calcium 600 mg + vitamin D_3 125 IU), taken orally once daily, one tablet each time, and Calcitriol Soft Capsules (Rocaltrol, 0.25 μg), taken orally twice daily, one capsule each time. On this basis, after excluding contraindications, anti-resorptive agents were added: either Alendronate Sodium Tablets (Fosamax, 70 mg) taken orally once weekly on an empty stomach, or Zoledronic Acid Injection (Aclasta, 5 mg/100mL) administered intravenously once yearly. The specific choice was made by the attending physician based on the patient's financial status, renal function, and preference. The differences between the two groups were not statistically significant ($P > 0.05$), indicating comparability.

2.2. Methods

2.2.1. Control Group: Conventional Health Education

1) During hospitalization: the responsible nurse used verbal explanations and distributed the *Osteoporosis Health Handbook* to explain to patients and their families the etiology of OVCF, the principle and precautions of PVP surgery, postoperative rehabilitation exercises, The health education content covers the correct usage and adverse reaction monitoring of anti-osteoporosis drugs (such as Calcium Carbonate D_3 tablets once daily, Calcitriol twice daily, Alendronate Sodium once weekly, or Zoledronic Acid once yearly), among other topics. 2) At discharge: written discharge instructions were provided, including dietary adjustments (high-calcium, high-protein), fall prevention measures, and regular follow-up (outpatient visits at 1, 3, 6, and 12 months postoperatively). 3) Post-discharge follow-up: the researcher conducted telephone follow-ups at 1, 3, 6, and 12 months postoperatively to answer patients' questions and remind them to take medication on time and attend scheduled follow-up appointments.

2.2.2. Observation Group: Flipped Classroom Health Education Based on the WeChat Platform

1) Preliminary preparation

Development of multimedia materials: The research team (including 2 spinal surgeons, 3 nurses, 1 rehabilitation therapist, and 1 dietitian) jointly produced textual and visual health education materials on OVCF, including images, short videos, PowerPoint presentations, and animations. The content covered: ① basic knowledge of osteoporosis and OVCF (in layman's terms); ② the PVP surgical

procedure and intraoperative cooperation; ③ early postoperative rehabilitation training (turning over in bed, sitting up, getting out of bed with a lumbar brace, etc.); ④ The health education content covers the correct usage and adverse reaction monitoring of anti-osteoporosis drugs (such as Calcium Carbonate D_3 tablets once daily, Calcitriol twice daily, Alendronate Sodium once weekly, or Zoledronic Acid once yearly), among other topics; ⑤ daily life management (fall-proof home modifications, balanced diet, sunlight exposure, etc.); ⑥ warning signs of re-fracture and emergency management. All content was reviewed by two spinal surgeons with associate senior titles or above.

Establishment of the WeChat work platform:A dedicated WeChat public account (service account) and a WeChat group were registered. The public account was used to regularly publish health education articles and videos; the WeChat group was used for interactive Q&A, assigning learning tasks, and organizing discussions.

Personnel training: Members of the research team received standardized training on the flipped classroom concept, WeChat platform operation, communication skills, and data collection. Only those who passed the assessment were allowed to participate in the implementation.

Platform maintenance: A designated person was assigned to update the content on the public account weekly and to be on duty in the WeChat group from 8:00 AM to 8:00 PM daily, answering patients' questions in a timely manner. An online thematic discussion was organized every two weeks.

2) Specific implementation of the flipped classroom

Pre-class learning (online self-study):

After admission, patients joined the WeChat platform, and the researcher distributed the *Flipped Classroom Learning Guide*. Learning materials were pushed in thematic modules according to different postoperative stages (preoperative, within 1 week after surgery, 2 - 4 weeks after surgery, 1 - 3 months after surgery, and 4 - 12 months after surgery). For example: before surgery, materials focused on knowledge related to PVP surgery; in the early postoperative period, emphasis was placed on pain management and in-bed rehabilitation; in the medium term, anti-osteoporosis medications and side-effect management were covered; for long-term follow-up, fall prevention and re-fracture prevention were highlighted. Patients were required to complete the learning tasks before each offline or online interaction and to record any questions they had.

Classroom interaction (offline face-to-face + online live broadcast):

During hospitalization: Face-to-face interactive sessions (30 - 45 minutes) were organized in the ward education room on Wednesday and Friday afternoons. Led by a nurse, each session began with 2 - 3 case studies or questions to check patients' pre-class learning outcomes. Then, common questions raised by patients were explained in detail. Finally, group discussions were held on topics such as "How to use bisphosphonates correctly" and "Which areas in your home are prone to falls and how to improve them." Patients were encouraged to share their

experiences, and the nurse corrected any misconceptions.

After discharge: Online live interactive sessions (accessed via Tencent Meeting integrated with WeChat) were organized at 1, 3, and 6 months after surgery, each lasting about 40 minutes. The content included reviewing recent knowledge points, addressing common questions, inviting patients with good adherence to share their experiences, and conducting a quiz on osteoporosis knowledge. The live sessions were recorded and uploaded to the public account for replay.

3) Monitoring and feedback:

The backend of the public account recorded the reading time and completion rate for each article/video. Patients who did not complete the learning tasks were reminded via private message. In the WeChat group, patients were required to check in weekly regarding their medication adherence and daily step count (or activity with lumbar brace wear). For those with poor adherence, a nurse conducted one-on-one private chats via WeChat to understand the reasons and provide personalized guidance.

2.3. Observation Indicators and Evaluation Tools

1) Disease knowledge mastery: A self-designed OVCF disease knowledge questionnaire was used for assessment. The questionnaire was developed by the research team (including 2 spinal surgeons, 3 nurses, 1 rehabilitation therapist, and 1 dietitian) based on literature review and clinical experience, with an initial item pool of 30 items. Two spinal surgeons with associate senior or above titles independently evaluated the relevance, clarity, and content coverage of the items. The content validity index (S-CVI) was calculated as 0.92, with item-level I-CVI ranging from 0.80 to 1.00. Based on expert opinions, 5 items with ambiguous or redundant wording were deleted, resulting in a pilot version consisting of 25 items. Subsequently, a pre-survey was conducted among 30 OVCF patients who met the inclusion criteria but were not enrolled in this study. Item discrimination was examined through item analysis (critical ratio > 3.0) and item-total correlation coefficients (>0.4), and all 25 items were retained. The Cronbach's α coefficient of the total questionnaire was 0.87, and the split-half reliability was 0.82, indicating good internal consistency. The final questionnaire covers the following domains: etiology of osteoporosis (5 items), knowledge related to PVP surgery (5 items), rehabilitation exercises (4 items), anti-osteoporosis medications (6 items), and fall prevention (5 items), with a total of 25 items. Each item is scored 1 point, giving a total score ranging from 0 to 25, with higher scores indicating better disease knowledge. The assessment was conducted before intervention (at admission), and at 1, 3, 6, and 12 months postoperatively.

2) Adherence to anti-osteoporosis treatment: The Morisky Medication Adherence Scale (MMAS-8) was used for assessment. This scale consists of 8 items, with a total score of <6 defined as low adherence, 6 - 7.5 as medium adherence, and 8 as high adherence. It should be particularly noted that this study did not make any modifications to the original items or scoring rules of the MMAS-8.

However, to make the scale applicable to the combined multi-drug anti-osteoporosis therapy in OVCF patients, when instructing patients to respond, the term "medication" in the items was explicitly defined as all anti-osteoporosis medications prescribed by the physician (including calcium supplements, vitamin D, bisphosphonates, or denosumab, etc.), and patients were asked to answer each item based on their overall taking of all such medications. Therefore, the scale structure, item content, and scoring criteria remained unchanged; only the scope of medications covered by the assessment was expanded. The assessment was conducted at 1, 3, 6, and 12 months postoperatively, respectively.

3) Re-fracture incidence: New fragility fractures (vertebral or non-vertebral, e.g., hip, distal radius) confirmed by X-ray or MRI during the follow-up period (within 12 months postoperatively). Images were independently read by two radiologists; disagreements were resolved through discussion.

4) Nursing satisfaction: The Newcastle Satisfaction with Nursing Scale (NSNS) was used to assess patients' satisfaction with nursing services. The scale consists of two dimensions (experience of nursing care and satisfaction with nursing care), with a total of 19 items. Each item is rated on a 5-point Likert scale (ranging from "very dissatisfied" to "very satisfied"), and the total score ranges from 19 to 95. Higher scores indicate greater nursing satisfaction. The Chinese version of the NSNS used in this study has demonstrated good reliability and validity (Cronbach's $\alpha = 0.89$). The assessment was conducted at the end of the 12-month postoperative period.

2.4. Statistical Methods

SPSS 26.0 software was used for data analysis. Continuous data were expressed as mean ± standard deviation ($\overline{x} \pm s$). Independent samples t-test was used for between-group comparisons, and repeated-measures analysis of variance (ANOVA) was applied for repeated measurement data. Categorical data were expressed as number of cases (%), and between-group comparisons were performed using the chi-square (χ^2) test or Fisher's exact test. A P-value < 0.05 was considered statistically significant. No formal a priori sample size estimation was performed in this study. The sample size (100 patients, 50 per group) was determined based on convenience sampling of eligible inpatients in the Department of Spinal Surgery at our hospital during the study period (January 2022 to June 2023). Therefore, this trial is **exploratory** in nature, with the primary aim of preliminarily evaluating the application effect of the WeChat platform-based flipped classroom health education model in OVCF patients, and providing a foundational basis for future multicenter, large-sample randomized controlled trials.

3. Results

3.1. Comparison of Disease Knowledge Mastery between the Two Groups

A total of 100 patients were enrolled in this study and randomly assigned to the control group (n = 50) or the observation group (n = 50). During the 12-month

follow-up period, 3 patients in the control group were lost to follow-up (1 refused to continue participation at 3 months postoperatively, 1 was lost to follow-up at 6 months, and 1 died of cerebrovascular disease at 12 months), resulting in 47 patients completing the 12-month follow-up. In the observation group, 2 patients were lost to follow-up (1 was lost to follow-up due to relocation to another province at 6 months, and 1 died in a traffic accident at 12 months), resulting in 48 patients completing the 12-month follow-up. The actual number of patients who completed follow-up at each time point in both groups is presented in the notes of Table 2 and Table 3. All statistical analyses were based on the cases with complete follow-up data at each respective time point, and no imputation was performed for missing data. The difference in attrition rates between the two groups was not statistically significant.

Table 2. Comparison of disease knowledge mastery between the two groups.

Group	Pre-intervention	1 month postop	3 months postop	6 months postop	12 months postop
Control group (n = 50)	12.3 ± 3.1	16.5 ± 3.4	18.2 ± 3.0	18.8 ± 2.9	18.5 ± 3.2
Observation group (n = 50)	12.0 ± 3.3	19.8 ± 3.1*	22.1 ± 2.5*	23.4 ± 2.0*	23.8 ± 1.8*

Note: Compared with the control group at the same time point, *P < 0.05.

Table 3. Comparison of treatment adherence between the two groups.

Group	1 month postop	3 months postop	6 months postop	12 months postop
Control group MMAS-8	6.0 ± 1.2	5.9 ± 1.3	5.5 ± 1.5	5.1 ± 1.6
Observation group MMAS-8	7.1 ± 0.9*	7.4 ± 0.8*	7.5 ± 0.7*	7.6 ± 0.6*

Note: *P < 0.05.

Before the intervention, there was no statistically significant difference in disease knowledge scores between the two groups (P > 0.05). Repeated-measures ANOVA showed that the observation group scored significantly higher than the control group at all follow-up time points (between-group effect: F = 32.15, P < 0.001). The time effect was also significant (F = 28.73, P < 0.001), indicating that scores in both groups changed over time. The group-by-time interaction effect was also significant (F = 6.82, P = 0.011), indicating that the two groups exhibited different trajectories of score changes over time. Based on simple effects analysis, the observation group showed a rapid upward trend in scores from 1 to 6 months postoperatively (P < 0.05 for all adjacent time-point comparisons), with the increase slowing between 6 and 12 months (P = 0.083). In the control group, scores also increased from 1 to 6 months postoperatively (P < 0.05), but showed no significant change after 6 months (P = 0.112). These results suggest that the upward

trend in scores in the observation group was more sustained over time, while the control group reached a plateau after 6 months postoperatively. See Table 2.

3.2. Comparison of Treatment Adherence between the Two Groups

At each postoperative time point, the MMAS-8 score in the observation group was higher than that in the control group ($P < 0.05$), and the proportion of patients with "high" adherence was significantly higher in the observation group than in the control group (at 12 months postoperatively, high adherence accounted for 70.0% in the observation group vs. 28.0% in the control group, $P < 0.001$). See Table 3.

3.3. Comparison of Re-Fracture Incidence between the Two Groups

Within the 12-month follow-up period, 8 re-fractures occurred in the control group (5 vertebral re-fractures, 2 hip fractures, and 1 distal radius fracture), yielding a re-fracture rate of 16.0%. In the observation group, 2 re-fractures occurred (both adjacent vertebral fractures), yielding a rate of 4.0%. The difference between the two groups was statistically significant ($\chi^2 = 4.000$, $P = 0.046$).

3.4. Comparison of Nursing Satisfaction between the Two Groups

At the end of the 12-month postoperative period, the total NSNS score in the observation group (85.2 ± 8.6) was significantly higher than that in the control group (72.5 ± 10.3), and the difference was statistically significant ($P < 0.001$). This indicates that the flipped classroom health education model based on the WeChat platform significantly improves OVCF patients' satisfaction with nursing services.

4. Discussion

4.1. The Flipped Classroom Health Education Based on the WeChat Platform Significantly Improves Disease Knowledge in OVCF Patients

The results of this study show that disease knowledge scores in the observation group were higher than those in the control group at all postoperative time points and continued to increase over time. Traditional health education mainly relies on one-way information delivery, with patients receiving information passively. After discharge, the lack of ongoing stimulation leads to easy forgetting of knowledge [9] [10]. In contrast, the flipped classroom model shifts the learning focus to pre-class preparation: patients use engaging materials such as videos, images, and text for self-study, and then bring their questions into the interactive sessions. During the interactive sessions, nurses do not simply repeat lectures but reinforce understanding and memory through case discussions, scenario simulations, and peer sharing. The WeChat platform allows learning resources to be reviewed at any time, and the fragmented delivery of content suits the cognitive characteristics of elderly patients. Therefore, knowledge mastery becomes more solid and lasting.

4.2. Flipped Classroom Health Education Improves Adherence to Anti-Osteoporosis Treatment

Patients with OVCF require long-term (at least 1 - 3 years) standardized use of anti-osteoporosis medications after surgery. However, clinical data show that medication adherence at one year postoperatively is often less than 50%. In this study, the MMAS-8 scores in the observation group were significantly higher than those in the control group at all follow-up time points ($P < 0.05$), reaching 7.5 and 7.6 at 6 and 12 months postoperatively, respectively, and gradually approaching a high adherence level (according to the MMAS-8 criteria, a score of 8 indicates high adherence); whereas the scores in the control group showed a declining trend over time, dropping to 5.1 at 12 months postoperatively. This benefit is attributable to the monitoring and motivational functions of the WeChat platform: weekly medication check-ins, group mutual support, private reminders, and regular posts on the public account regarding the importance of medications and management of side effects. Peer education within the flipped classroom (patients with good adherence sharing their experiences) also provided positive role modeling [11]. In addition, improved knowledge levels helped patients understand "why they need to take medication even when they are pain-free," thereby changing their health beliefs. The postoperative anti-osteoporosis medication regimens received by the two groups (baseline calcium + vitamin D, combined with alendronate or zoledronic acid) were comparable in terms of the composition of drug categories ($P > 0.05$). Therefore, the higher MMAS-8 scores in the observation group can be attributed to the difference in health education models, rather than to differences in the complexity of the medication regimens.

4.3. Reducing the Risk of Re-Fracture Is the Ultimate Manifestation of the Value of Health Education

Re-fracture is one of the most serious consequences of OVCF. In this study, the 12-month re-fracture rate in the observation group (4.0%) was significantly lower than that in the control group (16.0%), which is closely related to the higher treatment adherence and better fall-prevention behaviors in the observation group. Anti-osteoporosis medications (especially bisphosphonates or denosumab) can reduce the risk of vertebral re-fracture by 40% - 60%, while fall-prevention education (home modifications, balance training, correct use of walking aids) can reduce fall-related fractures by approximately 30%. The flipped classroom model integrates fall-prevention knowledge into daily interactions and encourages patients to share photos of home environmental modifications and to correct each other's mistakes within the WeChat group, making behavioral changes easier to achieve [12].

4.4. Innovation and Advantages

This study introduces the flipped classroom concept from education into patient health management, combined with the highly pervasive WeChat platform. The

innovative aspects include: 1) role shift—patients change from passive recipients to active learners, and nurses change from lecturers to facilitators; 2) continuity—breaking down the barriers between hospital and home, achieving comprehensive education from admission to home care; 3) interactivity—WeChat group discussions and live Q&A sessions meet individual needs; 4) low cost and high coverage—no additional hardware is required; a smartphone is sufficient for participation. Quantitative evaluation showed that the total NSNS score in the observation group was significantly higher than that in the control group, further confirming the positive role of this model in improving patients' experience with nursing services. Compared with educational interventions published in recent years, the flipped classroom adds an "interactive internalization" step and achieves better outcomes than traditional approaches [13].

4.5. Limitations and Future Directions

This study has the following limitations: 1) This study did not perform a pre-planned sample size calculation. The sample size was relatively small (only 100 patients) and was derived from a single-center convenience sample, which may limit statistical power and potentially affect the robustness of the results. Although repeated-measures ANOVA was used to compare between-group differences, multiple comparisons under a small sample size may increase the risk of Type I errors. Therefore, the findings of this study should be considered exploratory, and further validation with larger, multi-center studies is warranted; 2) lack of blinding (it is difficult to blind patients and nurses to health education), which may introduce measurement bias and lead to less favorable statistical analysis results; 3) elderly patients who are unable to use WeChat were excluded, limiting generalizability; 4) future multi-center large-sample studies are needed, with more objective outcome measures (e.g., changes in bone mineral density, fall records), and exploration of auxiliary modes suitable for elderly patients who are less familiar with smart devices (e.g., family assistance, voice interaction).

5. Conclusion

The flipped classroom health education model based on the WeChat platform effectively improves disease knowledge, adherence to anti-osteoporosis treatment, and nursing satisfaction, and reduces the risk of postoperative re-fracture in OVCF patients. With its strong feasibility, low cost, and durable effects, this model is a worthy transitional care intervention to be promoted in clinical practice.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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