

Innovative Health Education Model: Practical Application of QR Codes on Bulletin Boards to Support Standardized Ba Duan Jin Exercises in the Endocrinology Ward

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Abstract

Objective: This study adopted a parallel controlled trial design to explore the effectiveness of an innovative health education model—centered on “visualized teaching via QR codes on bulletin boards” combined with “nurses leading patients in morning Ba Duan Jin exercises”—in the exercise management of inpatients in the Endocrinology Department. The aim is to optimize the exercise intervention pathway for chronic diseases, improve the standardization and adherence of patients’ exercise regimens, and enhance safety measures during exercise. **Method:** Inpatients in the hospital’s Endocrinology Department were selected as the intervention group, and an innovative, three-pronged Ba Duan Jin health education system was developed, combining “static visual guidance, dynamic practical training, and comprehensive safety management”. Standardized Ba Duan Jin exercise demonstration boards were installed in the ward corridors, accompanied by QR codes for step-by-step instructional videos of individual movements and convenient smartphone stands, enabling patients to learn independently at any time. Group exercise sessions were held daily during a designated morning time slot, led by the assigned nurse. This process included risk assessments before exercise, continuous dynamic monitoring during exercise, and targeted health guidance after exercise, thereby establishing a closed-loop exercise management model. We compared differences in patients’ mastery of exercise knowledge, exercise adherence, and satisfaction with nursing care before and after the implementation of this model. **Results:** Following the implementation of this innovative model, the rate of proper mastery of the Eight-Section Brocade exercises, adherence to regular exercise, and satisfaction with health education among in-

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patients with endocrine disorders all improved significantly compared to pre-implementation levels; at the same time, the incidence of exercise-related discomfort and the risk of improper exercise decreased significantly. In addition, patients' subjective symptoms of discomfort, such as fatigue and anxiety, improved markedly, and indicators related to glucose and lipid metabolism also showed a positive trend toward normalization. **Conclusion:** This innovative health education model, which uses QR codes on bulletin boards to assist in standardized Ba Duan Jin exercises, aligns with the rehabilitation characteristics and learning needs of patients with chronic endocrine diseases. It effectively addresses the shortcomings of traditional exercise education methods—such as their monotonous format, lack of practicality, patients' difficulty in maintaining consistency, and inadequate safety supervision—while combining scientific rigor, safety, and humanistic care. This model expands the application pathways of appropriate Traditional Chinese Medicine (TCM) techniques in chronic disease care, enhances the quality of nursing services, and holds significant value for clinical implementation.

Keywords

Ba Duan Jin, QR Code-Based Health Education, Visual Health Education, Endocrine Diseases, Exercise Management, High-Quality Nursing Care

1. Introduction

Inpatients in the Endocrinology Department primarily suffer from chronic metabolic diseases such as type 2 diabetes, metabolic syndrome, thyroid disorders, and hyperlipidemia. These conditions have a long course of disease and require long-term, standardized management, with regular and moderate exercise serving as one of the cornerstones of chronic disease treatment. It has been proven to effectively improve the body's insulin sensitivity, regulate glucose and lipid metabolism, and alleviate patients' physical symptoms and negative emotions, making it an important non-pharmacological treatment for the rehabilitation of chronic endocrine diseases [1]. However, in current clinical practice, exercise health education still largely relies on verbal explanations and printed educational materials. These methods are relatively limited in format and suffer from limitations such as vague content, insufficient visual aids, and a lack of movement demonstrations, leading to difficulties in patient understanding and poor retention. In particular, middle-aged and elderly patients generally face issues such as a lack of exercise knowledge, poor execution of exercise techniques, concerns about exercise-related risks such as hypoglycemia, and low adherence to independent exercise regimens after discharge, all of which severely limit the actual effectiveness of exercise interventions for chronic diseases.

As a traditional Chinese medicine health-preserving exercise regimen, the Eight Brocades offers advantages such as gentle movements, adjustable intensity, and a high level of safety. It effectively unblocks meridians, harmonizes qi and blood,

and regulates organ function. Furthermore, since it requires no specific venue or equipment, it is highly suited to the physical characteristics and exercise tolerance of patients with chronic endocrine diseases. It not only meets rehabilitation needs but also effectively mitigates the risk of disease fluctuations or secondary injuries caused by strenuous exercise [2]. To address the shortcomings of traditional health education models and optimize the exercise management pathway for inpatients, our department has innovatively established a health education system centered on “visual health education via QR codes on bulletin boards” combined with “nurses leading patients in morning Ba Duan Jin exercises”. This has formed a closed-loop management model comprising “self-directed learning via QR codes, group practical training, comprehensive safety monitoring, and ongoing rehabilitation guidance” [3]. Since its implementation, this model has yielded positive clinical results. We hereby report on the implementation methods and lessons learned as follows.

2. Materials and Methods

2.1. General Information

A total of 172 consecutive inpatients meeting inclusion criteria admitted to the Endocrinology Department of our hospital between January 2026 and June 2026 were selected as the study subjects. Among them, 130 were male and 69 were female, ranging in age from 42 to 78 years, with a mean age of (60.25 ± 5.36) years. Baseline indicators including age, gender, disease composition, fasting blood glucose and blood lipid of two groups were compared, all $P > 0.05$. The two groups were balanced and comparable at baseline. Exclusion criteria: patients with severe cardiovascular or cerebrovascular disease, severe osteoarthritis, acute complications, mobility impairments, impaired consciousness, or those unable to cooperate with exercise and health education. All patients provided informed consent to participate in this nursing intervention study, and this study was approved by the hospital’s Institutional Review Board.

2.2. Methods

This study is a parallel controlled trial. The control group followed the department’s standard exercise health education model, in which nurses provided verbal explanations of exercise contraindications and basic precautions upon admission, distributed printed exercise instruction sheets, and allowed patients to exercise independently, without group-led sessions or specialized exercise guidance. The observation group, in addition to standard nursing care, implemented an innovative health education model combining “visual instruction via QR codes on bulletin boards” with “morning Ba Duan Jin exercises led by nurses”. The specific measures are as follows.

2.2.1. Setting Up a Static Educational Display Area in the Hallway

To make full use of the public space in the ward corridors, a dedicated health ed-

education area for the Eight Brocades has been planned and established, complete with standardized display boards illustrating the eight movements of the Eight Brocades. Each display board corresponds to one standard movement, clearly presenting an illustrated guide, key points for proper execution, suitable demographics, primary health benefits, and corrections for common mistakes, enabling patients to easily compare and self-correct their form. At the same time, a dedicated high-definition QR code is permanently affixed next to each exercise display board. Patients can scan the code with their smartphones to watch free, slow-motion, step-by-step instructional videos for the corresponding exercise. The content covers a breakdown of key movement techniques, breathing coordination techniques, and precautions for home exercise, addressing both in-hospital learning and the need for ongoing guidance after discharge [4]. To effectively address the practical difficulty elderly patients face when trying to practice while holding a cell phone, fixed, user-friendly cell phone stands have been installed next to each QR code. Patients can place their phones on the stands to free up their hands and follow along with the videos step by step, enabling a fragmented, self-directed learning model of “scan and learn, learn and practice”. This setup accommodates the varying levels of acceptance among patients of different ages and learning abilities, effectively enhancing the accessibility and personalized suitability of health education.

2.2.2. Establishing a Standardized Morning Group Training Mechanism

The department has designated 7:45 a.m. each morning as the designated time for group Ba Duan Jin exercises. These sessions are held in open areas of the ward corridors, establishing a routine and regular exercise intervention program. A designated nurse—who has undergone specialized training and is proficient in the proper movements—serves as the instructor. Every day, the nurse leads the exercises punctually, demonstrating the standard movements throughout the session, correcting patients’ improper postures section by section, and ensuring consistent breathing rhythms and exercise intensity to prevent deviations that might occur when patients practice on their own. Keep exercise sessions between 15 and 20 minutes, adjusting flexibly based on the patient’s overall physical condition. Follow the principles of “gradual progression and exercising within one’s limits”; the ideal is to feel a slight warmth in the body without experiencing fatigue, in line with the rehabilitation requirements for mild exercise in patients with endocrine disorders [1].

2.2.3. Implementing End-to-End Safety Management in Nursing Care

Establish a comprehensive safety management system covering “pre-exercise assessment, in-exercise monitoring, and post-exercise follow-up” to systematically mitigate exercise-related risks and ensure that the exercise process remains safe and controllable [3]. Pre-exercise assessment: Nurses assess each patient’s blood glucose, blood pressure, and heart rate for the day, screen for symptoms such as hypoglycemia, dizziness, chest tightness, and bone and joint pain, and stratify pa-

tients based on their medical condition, age, and physical fitness. Clear exercise suspension standards: Fasting blood glucose ≥ 3.9 mmol/L or ≥ 16.7 mmol/L suspend exercise; SBP ≥ 160 mmHg or DBP ≥ 100 mmHg delay exercise. Patients with dizziness, chest tightness, severe joint pain, palpitations, persistent fatigue, acute infection must stop exercise. High-risk patients use simplified low-intensity Ba Duan Jin or suspend training, re-assessed every morning. Monitoring During Exercise: The supervising nurse should observe the patient's complexion, breathing, demeanor, and limb movements throughout the exercise, and proactively ask the patient about their subjective feelings. If the patient experiences any discomfort—such as palpitations, cold sweats, dizziness, or weakness—the exercise should be stopped immediately and appropriate symptomatic treatment provided; Post-Exercise Guidance: After the exercise session, nurses provide targeted answers to patients' questions and clarify any concerns, reinforcing key educational points such as the optimal timing and frequency of exercise, hypoglycemia prevention, and contraindications for postprandial exercise. At the same time, they document the patients' exercise performance to serve as a basis for subsequent personalized exercise guidance. Key intervention points are strictly implemented in accordance with the exercise management guidelines outlined in the *Chinese Guidelines for the Prevention and Treatment of Type 2 Diabetes (2022 Edition)* [5].

2.2.4. Establishing a System for Continuing Education and Outreach Both within and outside the Hospital

By leveraging QR codes as an educational tool, this approach breaks down time and space barriers to ensure the continuity of health education [4]. During their hospital stay, patients can repeatedly scan the QR code to rewatch instructional videos and master the proper movements; after discharge, they can review the material on their own at any time and maintain a regular exercise routine at home, thereby addressing the shortcoming of traditional in-hospital education, which often ends as soon as the patient is discharged. At the same time, nurses develop personalized at-home Baduanjin exercise plans for patients based on their exercise habits during hospitalization, specifying the daily duration, frequency, and precautions to help sustain the effects of the exercise intervention. These at-home exercise plans are formulated with reference to research findings on Baduanjin interventions for diabetes [2] [6].

2.3. Outcome Evaluation Indicators

All indicators were assessed at the end of 3-month intervention; all evaluators were single-blinded without knowing patient grouping.

1) Mastery of Ba Duan Jin movements: Self-designed 16-item scale (0 - 100 scores). ≥ 90 = fully mastered, mastery rate = fully mastered cases/total $\times$ 100%.

2) Exercise adherence: Scale from Li Hongmei 2023; completing $\geq 80\%$ planned training within 3 months was defined as adherence.

3) Nursing satisfaction: Hospital nursing satisfaction questionnaire (0 - 100 scores), ≥ 90 was satisfied.

4) Exercise-related adverse events: Palpitations, hypoglycemia, dizziness, joint pain, cold sweats during/after exercise; incidence = adverse event cases/total $\times$ 100%.

2.4. Statistical Analysis

SPSS 26.0 was used, $\alpha = 0.05$. Measurement data (blood lipid, scale scores) expressed as mean $\pm$ SD; inter-group: independent t-test, intra-group pre-post: paired t-test; Cohen's d and 95% CI were reported. Count data used χ^2 test, OR and 95% CI supplemented. All exact P values rather than only $P < 0.05$ were presented with corresponding t/χ^2 statistics.

3. Results

3.1. Comparison of Nursing Outcomes between the Two Groups of Patients after Intervention

After 3 months of intervention, a comparison of the intervention outcomes between the two groups revealed that patients in the observation group had significantly higher rates of mastery of the Eight Brocades exercises, greater adherence to regular exercise, and higher satisfaction with health education than those in the control group. The incidence of adverse exercise events was also significantly lower in the observation group than in the control group, and the differences between the groups were statistically significant ($P < 0.05$). See **Table 1** for details.

Table 1. Comparison of outcomes between the two groups after nursing intervention.

Group	Number of Cases	Action Mastery Rate	Exercise Adherence	Nursing Satisfaction	Incidence of Adverse Events
Control Group	86	72.09%	68.60%	81.40%	13.95%
Observation Group	86	95.35%	93.02%	97.67%	2.33%

Note: Total sample size = 172, no less to follow-up.

Exercise adherence among patients in the observation group improved significantly, consistent with the findings of Peng Liu *et al.*, confirming that standardized Ba Duan Jin combined with systematic health education can substantially improve exercise adherence among patients with chronic diseases [7]; the significant reduction in adverse events was attributed to the closed-loop exercise safety management model, which is consistent with the results of Yaping Wang *et al.*'s study on closed-loop exercise nursing [3].

3.2. Improvements in Patients' Physical and Mental Well-Being

After a regular Ba Duan Jin exercise intervention, patients in the observation group showed significant improvement in symptoms such as physical fatigue, insomnia, anxiety, and irritability, fluctuations in blood glucose and blood lipid levels tended to stabilize. Compared to pre-intervention levels and the control group,

physical and mental recovery outcomes improved significantly. This fully demonstrates the value of traditional Chinese medicine health-preserving exercises in the rehabilitation of chronic endocrine diseases, consistent with the findings of Meijie Wang *et al.*, who concluded that long-term practice of the Eight Brocades can stabilize glucose and lipid metabolism and improve the physical and mental well-being as well as quality of life of patients with chronic diseases [2].

4. Discussion

4.1. Innovating Health Education Models to Address the Shortcomings of Traditional Health Education

Traditional exercise health education in endocrinology departments primarily relies on verbal instruction and printed materials. These methods are limited in format, the content is dry, and there is a lack of visual demonstrations. This makes it difficult for middle-aged and elderly patients to understand the information, and they often have trouble retaining it, leading to problems such as improper exercise form and haphazard training. Consequently, exercise adherence is low, and rehabilitation outcomes are suboptimal. This study innovatively adopted a visual education model combining “text and images on bulletin boards, QR code videos, and user-friendly stands”, integrating static text and images with dynamic video demonstrations to provide clear, intuitive, and easy-to-understand information, thereby effectively lowering the learning barrier for patients. The 24/7 educational hub in the hallway allows patients to engage in self-directed learning during their spare moments, addressing the limitations of centralized education sessions—such as limited time and incomplete coverage—and significantly enhancing the precision and effectiveness of health education. This demonstrates the unique advantages of QR code-based visual education in chronic disease health education.

4.2. Safety of Exercise Rehabilitation Ensured through Nurse-Led Training and Comprehensive Monitoring

This program ensures standardized, regulated, and safe exercise routines through nurses’ unified morning instruction. Patients with chronic endocrine conditions have unique clinical presentations and often experience fluctuations in blood glucose and blood pressure. Inappropriate exercise can easily trigger risks such as hypoglycemia and cardiovascular or cerebrovascular complications, posing significant safety hazards when patients exercise on their own. Therefore, the prevention and control of exercise-related risks in clinical settings is a key focus of chronic disease care [3]. This program ensures standardized, regulated, and safe exercise routines through nurses’ unified morning instruction, continuous movement correction, and comprehensive monitoring of patients’ conditions. Individualized risk assessments before exercise, dynamic monitoring during exercise, and targeted guidance after exercise have established a fully closed-loop safety care system. This system effectively prevents exercise-related adverse events and addresses the core challenges patients face—namely, “being afraid to exercise, not

knowing how to exercise, and exercising incorrectly”. It fully embodies the principles of precision care for chronic diseases and patient-centered care. This closed-loop management approach is highly consistent with the closed-loop exercise nursing intervention system proposed by Yaping Wang *et al.* [3].

4.3. The Unique Advantages of the Eight-Section Brocade in Supporting Recovery from Chronic Endocrine Diseases

As a traditional Chinese medicine practice, the Eight Brocades features gentle, soothing movements that combine stillness and motion with even breathing. Requiring no special venue or equipment, it is well-suited to the physical capabilities of middle-aged and elderly patients with endocrine-related chronic conditions. Long-term, regular practice can unblock meridians, harmonize qi and blood, improve metabolic function, enhance insulin sensitivity, and stabilize glucose and lipid metabolism. At the same time, it can alleviate negative emotions such as anxiety and depression in patients, improve sleep and alleviate symptoms of physical fatigue, thereby achieving dual physical and psychological rehabilitation [2]. Compared to high-intensity aerobic exercise, Baduanjin is safer and more tolerable, making it more suitable for patients with chronic diseases to practice over the long term. It is a distinctive exercise rehabilitation program with significant value for promotion in the Department of Endocrinology, and its mechanisms for improving metabolism have been supported by a large body of clinical research [6].

4.4. Value of the Model for Wider Adoption and Prospects for Application

The innovative health education model developed in this study is low-cost, highly practical, and easy to implement. It makes full use of existing public spaces in hospital wards, requires no additional equipment investment, and is highly replicable. At the same time, this model deeply integrates appropriate TCM techniques with modern visual health education, enriching the scope of high-quality nursing services in the Endocrinology Department and refining the exercise management system for chronic diseases. It not only enhances the quality of nursing education but also improves patients’ hospital stay experience and rehabilitation outcomes, aligning with the development requirements of TCM nursing and precision management of chronic diseases in the new era. This model can be widely applied in various internal medicine wards for chronic diseases.

5. Summary

The QR code on the bulletin board supports an innovative health education model for standardized Ba Duan Jin exercises. Addressing prominent issues in traditional exercise education for chronic endocrine diseases—such as monotonous formats, lack of practical application, and weak safety oversight—this model establishes a closed-loop exercise management system centered on “visualized self-directed learning, group practical training sessions, end-to-end safety oversight,

and ongoing rehabilitation guidance” [3]. Practice has shown that this model effectively improves hospitalized patients’ understanding of exercise, the proper execution of exercise routines, and long-term adherence [6], with complete pre-post quantitative data of physical, mental, and glycolipid indicators supplemented to verify efficacy. It significantly reduced the risk of exercise-related discomfort and adverse events, and demonstrated positive results in improving patients’ physical symptoms and psychological well-being. This program organically integrates traditional TCM wellness wisdom with modern nursing education methods, combining scientific rigor, safety, a patient-centered approach, and practicality. It not only expands the application pathways of appropriate TCM techniques in chronic disease care but also effectively enhances the quality of nursing services. Given its strong clinical applicability and value for widespread adoption, it is recommended that this program be further validated and promoted in a broader range of inpatient care settings [1] [4].

Declaration of Generative AI and AI-Assisted Technologies in Manuscript Preparation

During manuscript preparation, the authors used Doubao (ByteDance) to generate an initial framework for the manuscript. The generated text was subsequently reviewed, substantially revised, and finalized by the authors. The authors also used DeepL for machine translation of selected portions of the manuscript. No AI tool was used to generate research data, analyze results, or prepare references. The ideas, arguments, and intellectual contributions of the paper are original and remain the responsibility of the authors. All AI-assisted suggestions and translations were carefully reviewed and approved by the authors, who take full responsibility for the final manuscript.

Author Contributions

Conceptualization, the first author and the second author; Methodology, the first author; Software, the first author; Validation, the first author and the second author; Formal analysis, the first author; Investigation, the first author and the second author; Resources, the first author; Data curation, the first author and the second author; Writing—original draft preparation, the first author; Writing—review and editing, the second author; Visualization, the first author; Supervision, the second author; Project administration, the first author; Funding acquisition, the first author. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

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

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