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| RESEARCH ARTICLE

Barriers to the Implementation of Phase I Cardiac Rehabilitation from the Perspective of Medical Staff Based on Normalisation Process Theory: A Qualitative Study

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| ABSTRACT
Background/Objectives: Based on the Normalisation Process Theory (NPT), this study aims to systematically analyze the barriers to knowledge translation of Phase I cardiac rehabilitation (CR) from the perspective of medical staff. Methods: Purposive sampling and snowball sampling were used to recruit 12 members of the cardiac rehabilitation multidisciplinary team for one-on-one in-depth interviews. Colaizzi's seven-step phenomenological analysis method was employed to organize and summarize the interview data. Results: Four categories of barriers based on the NPT framework were identified: (1) Coherence barriers: low perceived value and benefits of CR among various stakeholders (insufficient explicit efficacy of CR, ambiguous cost-effectiveness); (2) Cognitive participation barriers: insufficient engagement and commitment of medical staff (decision-making inertia, role identity conflicts, risk perception conflicts); (3) Collective action barriers: low organizational resource readiness (leadership conflicts, fragmented referral systems, human resource shortages, lack of continuing education mechanisms for CR); (4) Reflexive monitoring barriers: low contextual compatibility (inadequate policy support, insufficient compatibility in evidence application). Conclusions: The NPT-based analysis reveals barriers in coherence, cognitive participation, collective action, and reflexive monitoring regarding Phase I CR knowledge translation from the perspective of medical staff. Enhancing medical staff's perceived value of CR, improving organizational resource readiness, and creating highly compatible contexts may systematically promote the normalization of Phase I CR into routine practice.

| KEYWORDS
Cardiac rehabilitation; knowledge translation; barriers; medical staff perspective; normalisation process theory.

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1. Introduction

Cardiac rehabilitation (CR) is an evidence-based, structured intervention technique for the chronic phase of cardiovascular disease, including patient education, health behavior modification, psychosocial management, pharmacotherapy, and exercise trainingiu(Xiu et al., 2026). Relevant domestic societies have issued several CR guidelines, clarifying the standardized processes and basic norms for CR in China. However, high-quality evidence for CR is still not embedded in practice. Low patient participation rates and insufficient evidence translation are urgent problems in CR evidence-based practice.

Knowledge translation promotes the dissemination of research evidence and bridges the gap between evidence and practice by integrating, disseminating, and appropriately applying knowledge in practice to provide more effective health services, thereby improving population health status and health system performance(Luo et al., 2019; Zhou et al., 2016), primarily implemented by a multidisciplinary team (MDT) consisting of cardiovascular medical staff, rehabilitation physicians, physiotherapists, and nutritionists, is a practical entry point for developing CR knowledge translation at the current stage(Mao et al., 2022) .Previous studies have mostly analyzed the influencing factors of CR implementation from the patient perspective(Liu et al., 2024; Xu et al.,

2024), neglecting the multidisciplinary nature of CR and the challenges posed by including professionals with different priorities, perspectives, and personalities(Starmer et al., 2020).

The Normalisation Process Theory (NPT) is a theoretical framework in implementation science that explains how new interventions become routine practice (Zhang et al., 2022) and has been widely applied in the process evaluation and barrier analysis of complex healthcare interventions. This study uses NPT as an analytical framework to systematically analyze the barriers to Phase I CR knowledge translation from a medical staff perspective, aiming to provide a theoretical basis for promoting the normalization of CR practice.

2. Materials and Methods

2.1. Participants

A purposive sampling method combined with a snowball sampling technique was used. From December 2023 to January 2024, the multidisciplinary team of a tertiary first-class general hospital was selected for one-on-one, in-depth interviews.

Inclusion criteria: (1) With working experience of no less than three years ; (2) work content related to cardiac rehabilitation; (3) informed consent and willingness to participate.

Exclusion criteria: (1) those not continuously on duty for more than 6 months due to further study, sick/maternity leave, or other reasons; (2) further training staff or interns.

Sample size determination followed: (1) the principle of maximum variation, including participants with different genders, ages, educational backgrounds, working years, and professional titles; (2) the principle of data saturation. A total of 12 participants were finally included: 6 cardiology nurses, 4 cardiology physicians, and 2 rehabilitation physicians. There were 9 females (75.0%), with a mean age of 34.58 years (SD = 5.56) and mean working experience of 11.83 years (SD = 6.13). All participants provided informed consent. This study was approved by the hospital ethics committee (Approval No. K-2024-050-K01).

Table 1. General information of participants (N = 12).

ID	Gender	Age	Education	Working Years	Professional Title
A1	Female	43	Bachelor	23	Senior
A2	Female	38	Bachelor	17	Senior
A3	Female	35	Bachelor	13	Intermediate
A4	Female	33	Bachelor	12	Intermediate
A5	Female	30	Bachelor	9	Intermediate
A6	Female	27	Master	3	Junior
B1	Male	45	Master	21	Senior
B2	Female	35	Master	10	Intermediate
B3	Male	38	Doctorate	14	Senior
B4	Male	30	Master	6	Intermediate
C1	Female	31	Master	8	Intermediate
C2	Female	30	Master	6	Intermediate

2.2. Theoretical Framework

This study used the Normalisation Process Theory (NPT) as its theoretical framework. NPT contains four core constructs used to explain how and why a new practice becomes routine. Coherence focuses on whether participants understand the meaning, value, and purpose of the new practice. Cognitive participation focuses on whether participants actively engage in and drive the new practice. Collective action focuses on the work, skills, resources, and relationships required for implementation. Reflexive monitoring focuses on how participants evaluate and monitor implementation effects. This study used NPT as a pre-set framework to guide the development of the interview guide and data analysis.

2.3. Interview Guide

The interview guide was determined through literature review and research team discussions. Two pilot interviews were conducted before the formal interviews. The final interview guide included the following questions: (1) Please describe your role and work content in the knowledge translation of Phase I CR (corresponding to Coherence). (2) How do you personally perceive the value of CR? Are there any factors hindering your understanding and recognition of CR? (corresponding to Coherence). (3) Do you actively participate in or promote CR work? Which factors affect your willingness to participate? (corresponding to

Cognitive participation). (4) In your daily work, what resources and support do you need to implement CR? What difficulties currently exist? (corresponding to Collective action). (5) How do you evaluate the current implementation effect of CR? Are there feedback and adjustment mechanisms? (corresponding to Reflexive monitoring). (6) What improvements do you think could address the above barriers?

2.4. Data Collection

To establish a trusting relationship with participants, those familiar with the participants introduced the purpose and process of the interview. After obtaining consent, a quiet, independent room was arranged for the interview. Before the formal interview, the researcher again explained the purpose, significance, process, and role of recording, promised confidentiality, and obtained consent for recording. Each interview lasted within 30 minutes. Techniques of Pause, Probe, and Paraphrase were used appropriately, avoiding commentary or evaluation of the participants(Chen, 2023) [9]. After the study, the recordings were deleted to protect participant privacy.

2.5. Data Analysis

Within 24 hours after the interviews, two researchers repeatedly listened to the recordings, transcribed the content verbatim, and imported it into MAXQDA2022 software. Colaizzi's seven-step analysis method(Liu, 2019) [10] was used to extract themes. Contact summary sheets, memos, and contextual analysis were used as supplementary methods for data analysis(Chen et al., 2023) [11]. The interview results were double-checked by two researchers, who discussed and analyzed different codes until consensus was reached. The results were returned to the participants for verification to ensure authenticity.

3. Results

Based on the NPT framework, interview data from 12 medical staff were analyzed, and barriers in four dimensions (Coherence, Cognitive participation, Collective action, and Reflexive monitoring) were extracted. Table 2 presents the barriers and supporting quotes.

Table 2. Barriers to knowledge translation of phase I cardiac rehabilitation based on the NPT framework.

NPT Dimension	Barrier Factors	Original Quotes (Participant ID)
Coherence barriers (low perceived value and benefits)	Insufficient explicit efficacy of CR	C1: "Patients perceive cardiac rehabilitation (CR) as distinct from standard medical treatment. Some elderly patients remain resistant to CR, even when their out-of-pocket cost after insurance reimbursement is only several dozen RMB. After healthcare providers teach patients breathing exercises, many believe they can simply practice along with online videos and see no need to pay additional fees." B3: "The long-term value of CR is difficult to quantify, and patient acceptance is low."
	Ambiguous cost-effectiveness	B1: "In the process of CR knowledge translation, considerations are not just about knowledge, but also patient acceptance and cost-effectiveness for patients and departments."
Cognitive participation barriers (insufficient engagement and commitment)	Decision-making inertia	B2: "Currently, surgical and pharmacological treatments are more commonly recommended in treatment decisions; CR receives insufficient attention."
	Role identity conflict (nursing perspective)	A3: "The role of nurses in CR knowledge translation is mainly health education; we don't know what else we can do." A5: "The same words spoken by a doctor have a different effect than from a nurse." A6: "Updating comprehensive CR concepts is difficult; nurses still think CR responsibility lies with the rehabilitation therapist."
	Role identity conflict (rehab perspective)	C1: "Without a doctor's recommendation or coordination, when a rehabilitation therapist provides exercise guidance, patients would worry about unnecessary charges. Only after a doctor's introduction do patients trust us."
	Risk perception conflict (nursing perspective)	A5: "Some critically ill patients, after their illness, fear that exercising again will cause safety problems." A4: "What should be done if problems occur during patient transfer to the rehab department?"
	Risk perception conflict (rehab perspective)	C1: "When a patient goes to rehabilitation for early CR, should a cardiologist be there for monitoring? If a problem occurs, how should it be handled?"
Collective action barriers (low organizational	Leadership conflicts	C1: "CR knowledge translation involves multi-departmental coordination. Even the placement of a single piece of CR equipment is debatable." A2: "There are

NPT Dimension	Barrier Factors	Original Quotes (Participant ID)
resource readiness)		disagreements between cardiology and rehab on patient transfer criteria; if not handled well, our willingness to refer decreases." B2: "A good coordination mechanism is most important for current CR knowledge translation, but there is still a gap."
	Fragmented referral system	C1: "Patient hospital stays are shortening; they might be discharged in 3-5 days. By the time we go to cardiology, the patient may have been discharged. Some information problems are reported but never solved; they are shelved." C2: "The information systems of cardiology and rehabilitation are separated. Identifying eligible patients requires manual searching. For each patient, multiple windows need to be opened (medical records, CR reporting system, various assessment forms)." A2: "Both nursing and rehabilitation therapist assess ADL, but there is no information exchange between them." A5: "The existing system does not reflect good team collaboration." C2: "The information filling for CR involves multiple assessments, taking a lot of time, besides handling other clinical tasks."
	Lack of CR continuing education mechanisms	A5: "CR is still in early development. Many new technologies and concepts require external training and exchanges; reading books alone or one or two isolated trainings is insufficient." A2: "Although we have cardiovascular specialty clinics and nurses, their learning focus is not on CR. More CR specialty nurses need to be trained." A4: "If I can only absorb 50% of the CR health education, then the patient can only absorb 50% of that." B2: "My understanding of CR is not very deep, mostly at the conceptual and theoretical stage."
	Human resource shortage	A1: "The biggest obstacle in CR knowledge translation is human resource shortage. Hospital expansion takes time, but we must also complete clinical tasks with quality and quantity; the workload is heavy." B3: "Recently, surgical volume is high; work hours are very tight. Dealing with routine clinical work is already overwhelming." C2: "Currently, there are insufficient dedicated CR staff. The work involves not only exercise guidance but also electronic records, follow-up, etc.; it's very stressful."
Reflexive monitoring barriers (low contextual compatibility)	Inadequate policy support	B1: "In recent years, macro and micro policy support for rehabilitation has increased, but there are differences among rehabilitation disciplines; more policy support is needed for CR." A3: "Setting up dedicated positions and incentives is feasible but requires hospital leadership support." C2: "Social publicity about the benefits of CR is needed to make more patients aware of CR's advantages."
	Low compatibility in evidence application	A5: "Knowledge or guidelines about CR in textbooks are systematic, but I don't know how to integrate them into clinical practice." C2: "Previously, some units tried to establish a hospital-community shared terminal to mimic foreign CR referral mechanisms, but it wasn't sustained." B1: "CR is not simply a template; patients are highly individual. One template cannot apply to everyone. For example, some patients fear activity and refuse to get out of bed, while others lack accessible exercise equipment. Are there alternatives?" A5: "Tai Chi, Baduanjin, and other traditional Chinese exercises are economical and convenient. Could we develop a CR practice with Chinese characteristics based on these?"

4. Discussion

Based on the Normalisation Process Theory, this study systematically analyzed the barriers to knowledge translation of Phase I cardiac rehabilitation from the perspective of medical staff. The results reveal barriers in four dimensions: coherence, cognitive participation, collective action, and reflexive monitoring.

4.1. Coherence Barriers: Low Perceived Value and Benefits Constrain CR "Meaning-Making"

The results of this study indicate that insufficient explicit efficacy of CR and ambiguous cost-effectiveness can lead to negative attitudes among patients and medical decision-makers. Patients struggle to perceive the short-term benefits of CR, and medical staff also find it difficult to quantify the impact of CR on long-term patient outcomes. According to cost-effectiveness data from high-income countries, a standard 12-week CR program would exceed the annual per capita healthcare expenditure in 55 out of 105 middle-income countries and all low-income countries(Thomas et al., 2023) [12]. Therefore, clarifying the short and long term cost-effectiveness of CR and developing low-cost, high-value CR knowledge translation models could help reduce

resistance to CR knowledge translation. Future efforts could enhance medical staff's perception of CR value through case studies and visualization of short-term efficacy data.

4.2. Cognitive Participation Barriers: Decision-Making Inertia, Role Identity, and Risk Perception Conflicts

The results of this study show that medical staff's cognitive participation is constrained by decision-making inertia, role identity conflict, and risk perception conflict. Physicians tend to prefer surgical and pharmacological treatments, leaving CR on the periphery. Furthermore, nurses and rehabilitation therapists commonly experience role identity conflict: nurses perceive CR as the responsibility of the rehab therapist or physician, while rehabilitaion therapists rely on physicians to establish patient trust. This suggests that future evidence-based practice of cardiac rehabilitation (CR) should clearly define the responsibilities and scope of work for each role, and enhance the sense of value and benefit among all stakeholders within the multidisciplinary team. Although several guidelines provide recommendations based on different exercise risk stratifications(Branch of Physical Medicine and Rehabilitation of Chinese Medical Association & West China Hospital, 2024) [13], nurses and rehabilitation therapists still experience uncertainty regarding patient safety risks during CR. A study by Zhu et al.(Zhu et al., 2020) [14] noted that "lack of legal provisions for CR physicians/nurses, lack of legal protection when performing CR" is an obstacle to CR implementation by medical staff.

4.3. Collective Action Barriers: Insufficient Organizational Resource Readiness

This study found that leadership conflicts, fragmented referral systems, human resource shortages, and lack of continuing education mechanisms are the main collective action barriers. Insufficient multi-departmental coordination leaves basic issues unresolved. Disconnected information systems make referrals reliant on manual searches. Human resource strain makes CR work an "additional burden." The lack of systematic CR continuing education means medical staff's understanding of CR remains theoretical. CR knowledge translation may face conflicts in information, personnel, equipment, and institutional processes; each barrier may take months to overcome(Beatty et al., 2023) [15]. Improving organizational resource readiness is a prerequisite for successful Phase I CR knowledge translation.

4.4. Reflexive Monitoring Barriers: Low Contextual Compatibility

The environment for evidence implementation, or "context," is a core factor influencing the effect of evidence implementation, including external (social, economic, political) and internal (implementation readiness, culture, climate) contextual factors(Zhang et al., 2021) [16]. According to the World Health Organization study, China has the world's largest rehabilitation need, with over 460 million people affected (Cieza et al., 2021). Phase I CR knowledge translation must also consider sustainability when transitioning to Phase II and Phase III CR. Tai Chi, Baduanjin, and other traditional Chinese medicine exercise trainings are more economical and convenient compared to modern CR programs and have good application prospects. Future research could explore evidence-based practice models for CR projects based on traditional Chinese medicine exercise training.

5. Conclusions

Based on the Normalisation Process Theory (NPT), this study analyzed the barriers to Phase I cardiac rehabilitation knowledge translation from the perspective of medical staff, revealing systemic barriers from "value perception" to "resource action" to "feedback monitoring," providing a theoretical basis for developing multi-level intervention strategies. Enhancing medical staff's perceived value of CR, improving organizational resource readiness, and creating highly compatible contexts can systematically promote the normalization of Phase I CR into routine practice. This study's sample was limited to a single tertiary hospital and did not include roles such as nutritionists or psychologists, limiting the generalizability of the results. Future multi-center studies with broader professional coverage are needed.

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Abbreviations

The following abbreviations are used in this manuscript:

Abbreviation	Full Form
CR	Cardiac Rehabilitation
NPT	Normalisation Process Theory
MDT	Multidisciplinary Team
SD	Standard Deviation

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