The Practice and Effectiveness of Multidisciplinary Collaboration in the Perioperative Nursing of Elderly Patients with Hip Fractures

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Abstract: Abstract: Hip fractures in the elderly, as a prevalent trauma-related condition in the context of an aging population, present significant clinical challenges in perioperative (preoperative, intraoperative, and postoperative) care. This is due to the complexity of patients' underlying diseases, distinct risk factors at each stage, and prolonged recovery periods, making perioperative nursing a key focus and a difficult aspect of clinical practice. The Multidisciplinary Team (MDT) model, which integrates cross-disciplinary resources and enables personalized diagnosis, treatment, and care throughout the perioperative period, has gradually been applied to perioperative nursing for elderly patients with hip fractures. This article focuses on the core priorities at each stage of the perioperative period, analyzing and discussing the current status of perioperative care for elderly hip fracture patients, the practical application of the MDT model across different stages, existing issues in its implementation, and directions for optimization. It aims to provide reference for clinically precise management of perioperative phases, optimization of nursing services, and improvement in the quality of perioperative care for elderly patients with hip fractures.

***Keywords*:** Multidisciplinary Team; elderly patients; hip fracture; perioperative nursing; current status of nursing care

1. Introduction

With the acceleration of global population aging, the incidence of hip fractures in the elderly has been rising year by year, becoming a significant public health issue that threatens the health of the elderly population[1]. Elderly patients with hip fractures are mostly aged 65 or above and often suffer from chronic underlying diseases such as hypertension, diabetes, and coronary heart disease[2]. Additionally, their physiological functions decline, and their immunity weakens, leading to complex and variable conditions, numerous risk factors, and significant rehabilitation challenges across all perioperative stages - including preoperative risk assessment, intraoperative safety assurance, and postoperative complication prevention and rehabilitation[3]. As a critical link connecting diagnosis, treatment, and recovery, perioperative nursing requires precise management of the priorities at each stage - preoperative, intraoperative, and postoperative. Its service quality directly impacts the treatment outcomes, rehabilitation progress, and quality of life of patients. Conventional perioperative nursing models, characterized by distinct disciplinary barriers and a lack of systematic coordination among different stages, struggle to meet the diverse nursing needs of patients throughout the entire perioperative process. Against this backdrop, the Multidisciplinary Team (MDT) model has emerged[4]. By integrating the expertise of multiple disciplines - such as orthopedics, geriatrics, and rehabilitation medicine—it establishes a comprehensive and continuous nursing system covering preoperative, intraoperative, and postoperative stages, providing patients with precise diagnosis, treatment, and nursing services at every phase. Based on clinical practice, this article focuses on the priorities at each stage of the perioperative period, systematically analyzes the current application status and related issues of the MDT model in the perioperative care of elderly patients with hip fractures, and offers theoretical support for the optimization and promotion of this model.

2. Analysis of the Current Status of Perioperative Nursing Care for Elderly Patients with Hip Fractures

2.1 Specificity and Key Differences in Nursing Needs Across Perioperative Stages

The perioperative nursing needs of elderly patients with hip fractures exhibit distinct stage-specific characteristics, with varying priorities and increased complexity across the preoperative, intraoperative, and postoperative stages - far exceeding those of general fracture patients, as shown in Figure 1. In the preoperative stage, the core needs are risk prediction and preparation optimization. This requires accurate assessment of the patient’s underlying diseases and surgical tolerance, along with psychological support and prehabilitation interventions to establish a foundation for surgical safety. Elderly patients often present with multiple comorbidities, and fluctuations in indicators such as blood pressure and blood glucose directly

affect surgical feasibility[5]. Additionally, preoperative anxiety and muscle insufficiency can increase surgical risks and complicate postoperative recovery.

During the intraoperative stage, the core needs are safety assurance and precise coordination. This involves close monitoring of vital signs, mitigating anesthesia risks, optimizing surgical assistance, and managing unexpected events such as acute exacerbations of underlying diseases[6]. Elderly patients often exhibit poor tolerance to anesthetics and are prone to intraoperative fluctuations in vital signs, necessitating multidisciplinary collaboration to manage every procedural aspect. In the postoperative stage, the core needs are complication prevention, pain management, and functional rehabilitation. This entails balancing wound care, stabilization of underlying diseases, and early rehabilitation training. It is essential to prevent complications such as deep vein thrombosis, pressure ulcers, and pulmonary infections associated with prolonged bed rest, while promoting hip joint functional recovery through personalized rehabilitation plans. Concurrently, precise pain control is crucial to enhance patient comfort and compliance with rehabilitation, demanding highly accurate and continuous nursing interventions.

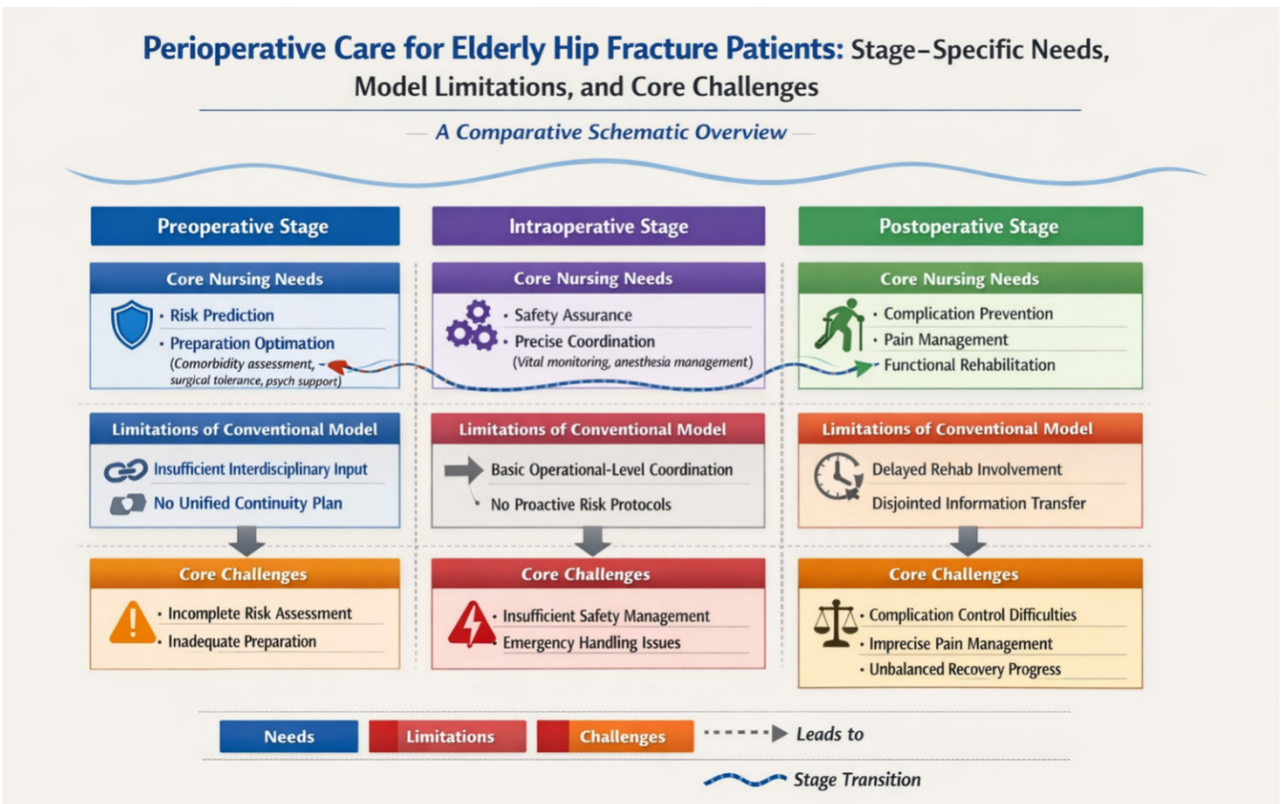

Figure 1. Three-Dimensional Comparison of Perioperative Care for Elderly Hip Fracture Patients: Stage-Specific Needs, Conventional Model Limitations, and Clinical Core Challenges

2.2 Limitations of Conventional Perioperative Nursing Models Across Stages

Currently, most clinical healthcare institutions still adopt conventional perioperative nursing models for elderly patients with hip fractures, primarily led by orthopedic nursing staff. This model exhibits significant limitations at each perioperative stage, failing to meet the stage-specific nursing needs of patients. First, insufficient interdisciplinary collaboration across stages: Preoperative care lacks precise assessment and intervention from geriatrics and nutrition departments, resulting in inadequate management of underlying diseases and nutritional support. Intraoperative coordination with anesthesiology remains at a basic operational level, lacking proactive risk prediction and collaboration[7]. Postoperative involvement of rehabilitation medicine is often delayed, leading to disjointed rehabilitation plans that do not align with the patient's recovery progress, creating gaps in care. Second, poor continuity of care across stages: There is often no unified plan connecting preoperative prehabilitation with postoperative rehabilitation training. Intraoperative vital sign monitoring data and risk assessments are not promptly communicated to the postoperative nursing team, resulting in less targeted postoperative interventions, hindered recovery progress, and persistently high complication rates[8]. Third, inadequate stage-specific expertise among nursing staff: Orthopedic nurses often lack sufficient cross-disciplinary, stage-specific knowledge in areas

such as preoperative assessment of underlying diseases, intraoperative emergency coordination, and multidimensional postoperative rehabilitation guidance. This limits their ability to accurately address the priorities of each stage and provide comprehensive, full-cycle nursing services.

2.3 Core Challenges in Perioperative Nursing Across Stages

Based on clinical practice, core challenges exist at each perioperative stage for elderly patients with hip fractures, directly impacting nursing quality and patient outcomes. In the preoperative stage, challenges center on incomplete risk assessment and inadequate preparation. Most healthcare institutions focus solely on fracture management, neglecting dynamic assessment of underlying diseases, precise evaluation of nutritional status, and in-depth psychological support. This often leads to surgical delays due to poorly controlled indicators or compromised surgical outcomes due to patient anxiety and physical frailty. During the intraoperative stage, challenges focus on insufficient safety risk management capabilities. Elderly patients face high anesthesia risks and are prone to intraoperative emergencies such as sudden blood pressure changes or arrhythmias[9]. Conventional nursing models, limited to basic operational support, lack multidisciplinary emergency response mechanisms, resulting in low efficiency in managing unexpected events. In the postoperative stage, challenges primarily manifest as difficulty in complication prevention, imprecise pain management, and imbalanced rehabilitation progress. Prolonged bed rest, underlying diseases, and surgical trauma collectively contribute to high complication rates. Elderly patients vary widely in their ability to express pain, making standardized analgesic protocols often inadequate for individual needs[10]. Additionally, rehabilitation training lacks stage-specific, precise guidance. Some patients may experience fracture displacement due to excessive exercise, while others develop joint stiffness due to insufficient activity, leading to inconsistent rehabilitation outcomes.

3. Current Status of the Practical Application of the MDT Model in Various Perioperative Stages for Elderly Hip Fractures

3.1 Construction of the MDT Team and Division of Responsibilities Across Stages

Currently, the majority of tertiary hospitals and some secondary hospitals in China have begun constructing MDT nursing teams for elderly hip fractures, covering the entire perioperative process. These teams are centered on orthopedics and integrate multidisciplinary professionals from geriatrics, anesthesiology, rehabilitation medicine, nutrition, pharmacy, nursing departments, and other specialties. The specific responsibilities of each discipline during the pre-, intra-, and post-operative stages are clearly defined, forming a closed-loop collaborative diagnosis, treatment, and care system. The phased division of responsibilities among disciplines is distinct: Preoperatively, orthopedic surgeons formulate the surgical plan, geriatricians meticulously manage underlying diseases and assess surgical tolerance, nutritionists optimize nutritional support plans, rehabilitation physicians initiate prehabilitation guidance, anesthesiologists' complete anesthesia risk assessment, and specialized nurses coordinate overall efforts, providing psychological counseling and health education. Intraoperatively, anesthesiologists continuously monitor anesthesia status and vital signs, orthopedic surgeons and nursing staff optimize surgical cooperation, and the MDT team forms emergency response units to manage unforeseen complications[11]. Postoperatively, orthopedic surgeons monitor fracture healing, geriatricians maintain stability of underlying diseases, anesthesiologists develop individualized analgesia plans, rehabilitation physicians advance phased rehabilitation training, nutritionists adjust nutritional plans, pharmacists ensure medication safety, and specialized nurses implement complication prevention and nursing measures, seamlessly connecting all aspects of the process. In terms of practical effectiveness, the establishment of MDT teams has broken down traditional disciplinary barriers, enabling comprehensive assessment and multidimensional interventions across all perioperative stages. This effectively addresses the shortcomings of conventional nursing models, such as poor inter-stage coordination and fragmented interventions. However, the operational level of MDT teams varies across different medical institutions. Due to limited medical resources, some primary-level hospitals struggle to achieve comprehensive multidisciplinary coverage. Prominent issues include a lack of professional nutritional assessment preoperatively and absence of postoperative rehabilitation guidance, which limits the effectiveness of the MDT model across perioperative stages and hinders the formation of a fully closed-loop care process[12].

3.2 Core Practical Workflow of the MDT Model Across Perioperative Stages

Leveraging the collaborative advantages of MDT teams, most medical institutions have established standardized perioperative nursing workflows focused on key aspects of the pre-, intra-, and post-operative stages, achieving precise intervention throughout the entire cycle. The preoperative stage centers on "risk management and preparation optimization." Within 24 hours of admission, a specialized nurse organizes the first MDT consultation, involving simultaneous assessment

by all disciplines: Geriatricians adjust medications for underlying conditions like hypertension and diabetes to bring indicators within a safe surgical range; Rehabilitation physicians guide prehabilitation exercises, such as quadriceps contractions and ankle pump exercises, based on the patient's physical condition to enhance muscle strength and prevent preoperative muscle atrophy; Nutritionists assess indicators like albumin and hemoglobin, provide guidance on high-protein, high-calcium diets, and offer enteral nutritional support if necessary to improve surgical tolerance; Anesthesiologists formulate suitable anesthesia plans considering the patient's age and underlying diseases, anticipating anesthesia risks; Specialized nurses provide psychological counseling for patient anxiety, while explaining surgical procedures, preoperative preparation essentials, and cooperation points to ensure full understanding and active participation by patients and their families.

The intraoperative stage focuses on "safety assurance and precise coordination," establishing a multidisciplinary collaborative operational system: Anesthesiologists employ neuraxial or general anesthesia (chosen based on patient tolerance), continuously and closely monitoring vital signs like heart rate, blood pressure, and blood glucose, adjusting anesthesia medications in real-time, and promptly managing anesthesia-related adverse reactions;[13] Orthopedic surgeons and nursing staff cooperate closely to optimize surgical procedures, shorten operative time, and reduce surgical trauma; The MDT emergency response unit remains on standby throughout, developing protocols and responding swiftly to potential intraoperative emergencies like acute exacerbation of underlying diseases or major bleeding, ensuring surgical safety. The postoperative stage revolves around "complication prevention, pain management, and rehabilitation advancement." A second MDT consultation is organized within 24 hours post-surgery to dynamically adjust the care plan: Anesthesiologists implement multimodal analgesia (e.g., oral + intravenous patient-controlled analgesia), precisely adjusting medications based on pain scores to prevent pain from hindering recovery; Geriatricians continuously monitor indicators of underlying diseases and dynamically optimize medication regimens to prevent acute exacerbations; Rehabilitation physicians develop phased rehabilitation plans based on the surgery type (femoral neck fracture, intertrochanteric fracture) and the patient's recovery progress, initiating passive exercises early postoperatively and gradually transitioning to active and weight-bearing training to mitigate risks of joint stiffness and muscle atrophy[14]; Nutritionists adjust nutritional plans, increasing dietary fiber and protein intake to prevent constipation and wound infection; Specialized nurses implement meticulous nursing care, strengthening monitoring of wound bleeding, pressure injury prevention, and deep vein thrombosis prophylaxis (e.g., pneumatic compression therapy, guidance on anticoagulant use).

3.3 Application Value of the MDT Model Across Perioperative Stages

Based on feedback from clinical practice, the application value of the MDT model, through its precise alignment with key perioperative stage priorities, is now fully evident. In the preoperative stage, multidisciplinary collaborative assessment and intervention effectively reduce surgical delay rates and enhance patient surgical tolerance, laying the foundation for surgical safety. In the intraoperative stage, the multidisciplinary emergency coordination mechanism and precise cooperation reduce the incidence of anesthesia risks and intraoperative complications, shorten surgical duration, and improve surgical safety. In the postoperative stage, the implementation of personalized complication prevention, pain management, and rehabilitation plans significantly lowers the incidence of severe complications like deep vein thrombosis and pulmonary infections, accelerates the recovery of hip joint function, and improves patients' postoperative self-care ability and quality of life, as shown in Figure 2.

Furthermore, the MDT model facilitates information exchange and process across perioperative stages, avoiding issues like redundant examinations and interventions, thereby enhancing healthcare service efficiency and reducing medical costs. The participation of multidisciplinary personnel in the diagnosis, treatment, and care of each stage also provides patients and their families with comprehensive health guidance and psychological support, effectively alleviating their anxiety and improving satisfaction with medical services and recognition of nursing care.

4. Existing Issues in the Application of the MDT Model Across Perioperative Stages

4.1 Inadequate Collaboration Mechanisms Across Stages and Poor Information Flow

Unsound team collaboration mechanisms represent the most prominent issue affecting the application of the MDT model across perioperative stages, directly impacting the effectiveness of transitions between phases. Although some medical institutions have established MDT teams, they lack specialized collaboration systems tailored to the pre-, intra-, and post-operative stages. Examples include unfixed preoperative consultation times, unclear intraoperative emergency response protocols, and unstandardized transitions from postoperative rehabilitation to in-hospital care, leading to chaotic team operations. Simultaneously, communication channels between disciplines are relatively limited. Information such as preoperative assessment results, intraoperative vital sign data, and postoperative nursing records often relies on offline

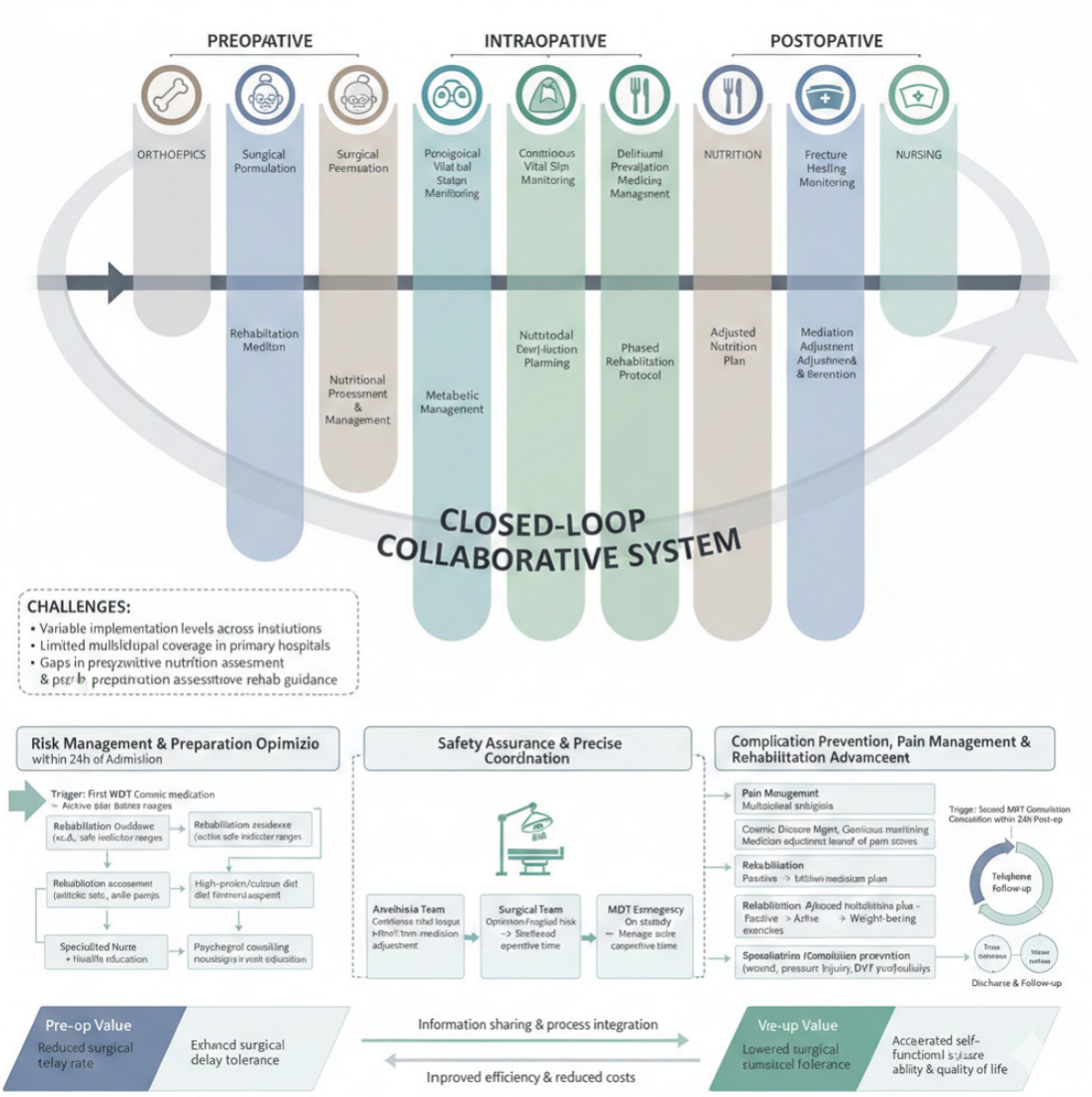

Figure 2. Schematic diagram of the whole nursing model for elderly patients with hip fracture during perioperative period based on MDT

transfers and telephone communication, lacking efficient information platforms[15]. This results in untimely and inaccurate information transmission, hindering the precise implementation of critical diagnosis, treatment, and nursing recommendations across stages.

4.2 Uneven Distribution of Medical Resources and Lack of Intervention Across Stages in Primary Care

The effective operation of the MDT model depends on sufficient medical resources and professional disciplinary support. However, the current uneven distribution of medical resources in China leads to a widespread lack of MDT intervention across perioperative stages in primary care institutions. Most primary-level hospitals lack specialized physicians in rehabilitation medicine, nutrition, geriatrics, etc. Preoperatively, they cannot conduct precise assessment of underlying diseases and nutritional intervention, relying solely on orthopedic surgeons for basic surgical indication evaluation. Intraoperatively, they lack professional anesthesiologists for continuous precise monitoring and have weak emergency response capabilities. Postoperative rehabilitation guidance and nutritional support are largely absent, with only basic wound care and complication prevention possible, preventing the formation of a full-process MDT intervention. Additionally, the professional competence of nursing staff in primary hospitals is limited[16]. They lack MDT collaboration training specific to perioperative stages and have insufficient mastery of skills such as preoperative prehabilitation guidance, intraoperative emergency coordination, and postoperative multimodal analgesia. This makes it difficult to accurately grasp the key points of each stage, further

restricting the application of the MDT model in perioperative care at the primary level.

4.3 Insufficient Patient and Family Understanding, Leading to Variable Cooperation Across Stages

The understanding of patients and their families regarding the MDT model and the key priorities of each perioperative stage directly influences the effectiveness of nursing interventions. Some elderly patients and families believe that fracture treatment relies solely on orthopedic surgeons, undervaluing multidisciplinary interventions such as preoperative management of underlying conditions, prehabilitation training, and postoperative rehabilitation and nutritional support. This manifests as refusal to cooperate with prehabilitation preoperatively, stopping rehabilitation exercises postoperatively, or not adhering to nutritional guidance. Furthermore, some patients, due to advanced age or cognitive decline, have limited understanding and execution ability regarding preoperative preparation requirements, intraoperative cooperation points, and postoperative rehabilitation exercises. Families, lacking professional nursing knowledge, cannot provide effective home care and rehabilitation assistance post-discharge. This makes it difficult to sustain rehabilitation training after discharge, breaking the continuity of the full perioperative rehabilitation process and impacting overall care outcomes.

4.4 Lack of Standardized Stage-Specific Assessment and Quality Control Mechanisms

Currently, in China, the application of the MDT model in perioperative care for elderly hip fractures lacks standardized assessment systems and quality control mechanisms tailored to the pre-, intra-, and post-operative stages. Regarding stage-specific assessment, indicators and tools used vary across institutions. There is a lack of uniformity in preoperative surgical tolerance assessment, intraoperative risk monitoring indicators, and postoperative rehabilitation outcome evaluation, leading to care plan development lacking a scientific basis and insufficient intervention precision. Regarding quality control, most institutions have not established stage-specific quality evaluation indicators. They lack effective monitoring and assessment of preoperative intervention implementation, intraoperative collaboration effectiveness, and postoperative complication prevention quality. This inability to promptly identify and rectify problems in each stage's operation affects the stability of the MDT model's application quality throughout the entire perioperative process.

4.5 Insufficient Stage-Specific MDT Competence and Weak Professional Skills Among Nursing Staff

Specialized nurses, as core coordinators within the MDT team and implementers of stage-specific nursing measures, directly impact the model's operational effectiveness through their stage-specific MDT competence and professional skills. Currently, most orthopedic specialized nurses in clinical practice lack systematic perioperative stage-specific MDT training. Their abilities in assisting with preoperative underlying disease assessment, intraoperative emergency coordination, and integrating multidisciplinary opinions postoperatively are insufficient, making it difficult to effectively coordinate disciplinary resources and connect stage-specific nursing work. Simultaneously, some nursing staff lack specialized skills for each stage, such as preoperative psychological counseling techniques, intraoperative precise vital sign monitoring ability, and postoperative pain scoring and rehabilitation guidance skills. This makes it challenging to meet patients' diverse nursing needs across perioperative stages. Additionally, the emergency response and interdisciplinary communication skills of nursing staff need improvement. When faced with intraoperative emergencies, interdisciplinary disagreements, or non-cooperation from patients/families, they may be unable to respond effectively, hindering the smooth progress of stage-specific nursing work.

5. Countermeasures and Suggestions for Optimizing the Application of the MDT Model Across Perioperative Stages

5.1 Improve Stage-Specific Collaboration Mechanisms to Ensure Smooth Information Flow

Sound stage-specific collaboration mechanisms are crucial for the efficient operation of the MDT model. Medical institutions should formulate specialized MDT collaboration systems and process standards based on the key priorities of each perioperative stage. This includes clarifying preoperative consultation timeframes, intraoperative emergency response protocols, and postoperative transition requirements, detailing the division of responsibilities for each discipline in each stage to avoid overlap and omission of duties. Concurrently, accelerate information technology development by establishing dedicated MDT communication platforms. Integrate information such as preoperative assessment reports, intraoperative vital sign data, postoperative nursing records, and rehabilitation progress to enable real-time sharing, online communication, and documented opinions among multidisciplinary personnel, ensuring timely and accurate information transmission across

stages.

5.2 Optimize Resource Allocation to Address the Shortcomings in Stage-Specific Interventions in Primary Care

To address the uneven distribution of medical resources, strengthen top-level planning and macro-management by increasing investment in primary medical institutions. Focus on supporting weak disciplines such as rehabilitation medicine, nutrition, and geriatrics, enriching the professional workforce to address the lack of stage-specific perioperative interventions at the primary level. Simultaneously, considering the actual medical resources in primary settings, simplify MDT operational processes to build streamlined and efficient stage-specific MDT teams. Focus on key areas such as preoperative management of underlying conditions, intraoperative safety assurance, and prevention of core postoperative complications to ensure the model's operability and practicality at the primary level[17].

5.3 Implement Stage-Specific Health Education to Enhance Patient and Family Cooperation

Develop and implement stage-specific, targeted health education programs integrated throughout the entire perioperative process - preoperative, intraoperative, and postoperative. Preoperatively, explain the importance of managing underlying conditions and prehabilitation training to patients and families, clarifying preoperative preparation essentials and cooperation points. Intraoperatively, briefly inform patients and families about anesthesia methods, surgical procedures, and safety measures to alleviate anxiety. Postoperatively, focus on explaining methods and significance of complication prevention, pain management, and stage-specific rehabilitation training, guiding families on home care and rehabilitation assistance techniques. Employ diverse education methods, such as one-on-one preoperative explanations, brief intraoperative reassurance, and postoperative video demonstrations and case sharing. Use simple, understandable language considering the cognitive characteristics of elderly patients to ensure effectiveness.

5.4 Establish Stage-Specific Standardized Systems and Quality Control Mechanisms

At the industry level, take the lead in formulating standardized systems for the stage-specific application of MDT in the perioperative period. Clearly define preoperative assessment indicators (underlying diseases, nutritional status, surgical tolerance), intraoperative monitoring standards (vital signs, anesthesia status), and postoperative assessment content (complications, pain, rehabilitation progress). Standardize assessment tools and intervention processes to achieve standardization and of stage-specific nursing services. Medical institutions should establish stage-specific quality control systems based on industry standards. Set up MDT quality monitoring groups to regularly monitor and evaluate indicators such as preoperative intervention implementation rate, intraoperative collaboration satisfaction, postoperative complication incidence, and rehabilitation outcomes. This allows for timely identification and corrective measures for issues arising during each stage's operation. Furthermore, incorporate stage-specific MDT nursing quality into departmental performance evaluation systems to incentivize active participation in stage-specific collaboration by all disciplines and improve nursing service quality.

5.5 Strengthen Stage-Specific Training to Enhance Nursing Staff's MDT Competence

Develop perioperative stage-specific MDT training plans to targeted enhance nursing staff's professional abilities for each stage. Preoperative training should focus on skills in assisting underlying disease assessment, prehabilitation guidance, psychological counseling, and health education. Intraoperative training should emphasize emergency coordination, precise vital sign monitoring, and surgical assistance capabilities. Postoperative training should center on complication prevention, pain scoring and management, rehabilitation guidance, and integrating multidisciplinary opinions. Utilize methods such as case discussions, simulation drills, and on-the-job learning, inviting experts from various disciplines to teach, thereby improving nursing staff's stage-specific MDT skills, communication and coordination abilities, and emergency response capabilities.

6. Conclusion

Elderly hip fracture patients exhibit distinct and critical care needs across the different stages of the perioperative period (preoperative, intraoperative, and postoperative). Conventional nursing models, characterized by significant disciplinary barriers and fragmented interventions across stages, often fail to adequately meet clinical demands. The Multidisciplinary Team (MDT) model addresses this by integrating interdisciplinary resources to establish a comprehensive care system that spans preoperative risk management, intraoperative safety assurance, and postoperative complication prevention and rehabilitation. This model demonstrates notable advantages in optimizing workflows for each perioperative stage, reducing stage-specific risks, promoting patient recovery, and enhancing overall nursing quality, positioning it as a key direction for

the development of clinical nursing practice. However, current applications of the MDT model still face several challenges, including imperfect stage-specific collaboration mechanisms, a lack of intervention in primary care settings, insufficient patient compliance, absence of stage-specific quality control measures, and limited professional competencies among nursing staff. These issues hinder the broader adoption and effectiveness of the model.

Looking ahead, it is essential to continuously refine the MDT approach by improving stage-specific collaboration mechanisms, optimizing resource allocation, implementing targeted health education, establishing standardized systems, and strengthening stage-specific training. These efforts will promote the widespread and standardized application of the model across healthcare institutions at all levels, enabling precise management of key perioperative phases. Ultimately, this will provide elderly hip fracture patients with higher-quality, more efficient, and personalized perioperative care, thereby improving patient outcomes and enhancing the overall health of the aging population.

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