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HIP FRACTURES IN ADULTS

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REVIEW ARTICLE

Hip Fracture Physiotherapy: Evidence-Based Practice and Rehabilitation Strategies

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Abstract

Hip fractures represent a significant healthcare challenge globally, particularly affecting older adults aged 65 years and above. This comprehensive review examines evidence-based physiotherapy interventions for hip fracture rehabilitation across acute, subacute, and chronic phases of recovery. The article synthesizes current research findings and established clinical guidelines, with particular emphasis on National Institute for Health and Care Excellence (NICE) recommendations and their application in resource-limited settings such as Nepal. Key physiotherapy interventions include early mobilization within 24-48 hours post-surgery, progressive resistance training, balance and proprioceptive exercises, gait training, and fall prevention strategies. The multidisciplinary team approach is essential for optimal outcomes, with physiotherapists playing a central leadership role in mobility restoration and patient education. Special considerations are addressed for geriatric patients, including cognitive impairment and delirium management, as well as the impact of comorbidities such as diabetes and cardiovascular disease. The article also explores the unique challenges faced in Nepal's healthcare system, including urban-rural disparities, cultural factors, and resource limitations, while identifying opportunities for community-based rehabilitation and innovative approaches such as telerehabilitation. Emerging technologies including digital tools and robotic-assisted physiotherapy offer promising avenues for enhancing rehabilitation outcomes. This review provides a comprehensive framework for healthcare professionals to deliver optimal, evidence-based physiotherapy services for hip fracture patients while considering contextual adaptations for diverse clinical settings.

KEYWORDS

Hip Fractures; Physical Therapy Modalities; Rehabilitation; Early Ambulation; Recovery of Function; Aged; Accidental Falls; Exercise Therapy

Introduction

Hip fractures represent one of the most significant healthcare challenges globally, particularly affecting older adults. Hip fracture is a leading cause of profound morbidity in individuals aged 65 years and older, ranking in the top 10 causes of loss of disability-adjusted life-years for older adults.[1]The global burden of hip fractures continues to escalate, with projections indicating substantial increases due to aging populations worldwide.[1] The demographic profile of hip fracture patients reveals a predominant occurrence in individuals over 65 years, with women experiencing a higher incidence rate due to post-menopausal osteoporosis. The clinical significance extends beyond the immediate injury, as hip fractures are associated with increased mortality rates, prolonged

hospitalization, reduced functional independence, and significant economic burden on healthcare systems. The condition frequently results in permanent disability, with many patients never returning to their pre-fracture functional status.[1]Epidemiological data suggests that the lifetime risk of sustaining a hip fracture ranges from 11-25% in women and 5-13% in men, with variations based on geographical location and population characteristics.[2] More than 20% of female patients, and more than 30% of male patients die within one year of sustaining a hip fracture, emphasizing the urgent need for comprehensive, evidence-based rehabilitation strategies.

Physiotherapy plays a pivotal role in hip fracture rehabilitation, serving as a cornerstone intervention that directly influences patient outcomes across multiple domains. Greater access to physiotherapy was associated with a higher probability of positive outcomes. For every 100 patients, greater access could equate to an additional eight patients surviving to 30-days and six avoiding 30-day readmission.[3]This evidence underscores the life-saving potential of comprehensive physiotherapy intervention. The multifaceted benefits of physiotherapy in hip fracture rehabilitation encompass physical function restoration, mobility enhancement, pain management, and overall quality of life improvement. Available evidence supports that exercise interventions improve physical function and mobility in older adults after hip fracture; specifically, resistance exercise with progressive load of 60-80% one-repetition maximum (1RM) and functional exercise may be critical intervention components.[4]

Early physiotherapy intervention has been shown to reduce complications associated with prolonged immobility, including deep vein thrombosis, pneumonia, muscle atrophy, and bone demineralization. Furthermore, structured rehabilitation programs contribute to improved balance, reduced fall risk, enhanced confidence in movement, and faster return to independent living. The psychological benefits include reduced anxiety, depression, and fear of falling, which are common sequelae of hip fractures in older adults.[5] The objective of this article is to provide a comprehensive, evidence-based framework for physiotherapy management of hip fractures, integrating international best practices with contextual considerations for clinical practice, particularly in resource-limited settings such as Nepal.

Physiotherapy Assessment & Goal Setting

Initial Assessment

Comprehensive initial assessment forms the foundation of effective hip fracture rehabilitation, requiring systematic evaluation of multiple physiological and functional domains. The assessment process should commence as early as clinically feasible, ideally within 24-48 hours post-surgery, consistent with evidence-based practice recommendations.[6] Pain assessment constitutes the primary consideration, utilizing validated tools such as the Visual Analog Scale (VAS) or Numerical Rating Scale (NRS). Pain evaluation should encompass rest pain, movement-related pain, and functional pain during specific activities. Understanding pain patterns and triggers enables targeted intervention strategies and appropriate medication optimization in collaboration with the medical team.[7]

Range of motion (ROM) assessment involves systematic evaluation of hip, knee, and ankle joints bilaterally. Active ROM testing should be prioritized when patient cooperation permits, with passive ROM assessment serving as an alternative when active movement is limited. Particular attention should be directed toward hip flexion, extension, abduction, and internal/external rotation, noting any restrictions that may impact functional activities or indicate complications.[8]

Strength, mobility, gait, balance, and fall risk must be assessed with consideration of surgical precautions and healing status. Strength testing begins with isometric contractions in pain-free ranges and progresses to dynamic evaluation as tolerated, focusing on hip abductors, extensors, flexors, and quadriceps with bilateral comparison. Functional mobility assessment covers bed mobility, sit-to-stand, chair transfers, ambulation, and assistive device needs, with standardized tools such as the Functional Independence Measure (FIM) or Modified Barthel Index documenting progress. Gait analysis evaluates weight-bearing status, walking pattern, balance, and safety. Balance assessment should include both static (sitting, standing) and dynamic tasks relevant to daily function. Fall risk evaluation considers prior falls, cognition, medications, environment, and physical impairments, supported by validated tools like STRATIFY or the Morse Fall Scale.[9]

Goal Setting

Evidence-based goal setting after surgery integrates patient preferences, clinical expertise, and realistic expectations. Unless contraindicated, mobilisation should begin the day after surgery, forming the basis for short-term goals (0–2 weeks) such as safe transfers, pain control, DVT prevention, early mobility, and protected weight-bearing ambulation with assistive devices. Medium-term goals (2–8 weeks) emphasize progressive strength, independence in activities of daily living (ADLs), safe ambulation, balance, and adherence to home exercise. Long-term goals (2–6 months) target community reintegration, fall prevention, bone health, and confidence in mobility. Patient-centered planning, cultural context, and multidisciplinary collaboration ensure meaningful, measurable, and adaptive rehabilitation outcomes.[10]

Physiotherapy Interventions in Proximal Hip Fracture

Proximal hip fractures—including femoral neck, intertrochanteric, and subtrochanteric fractures—are among the most serious injuries in older

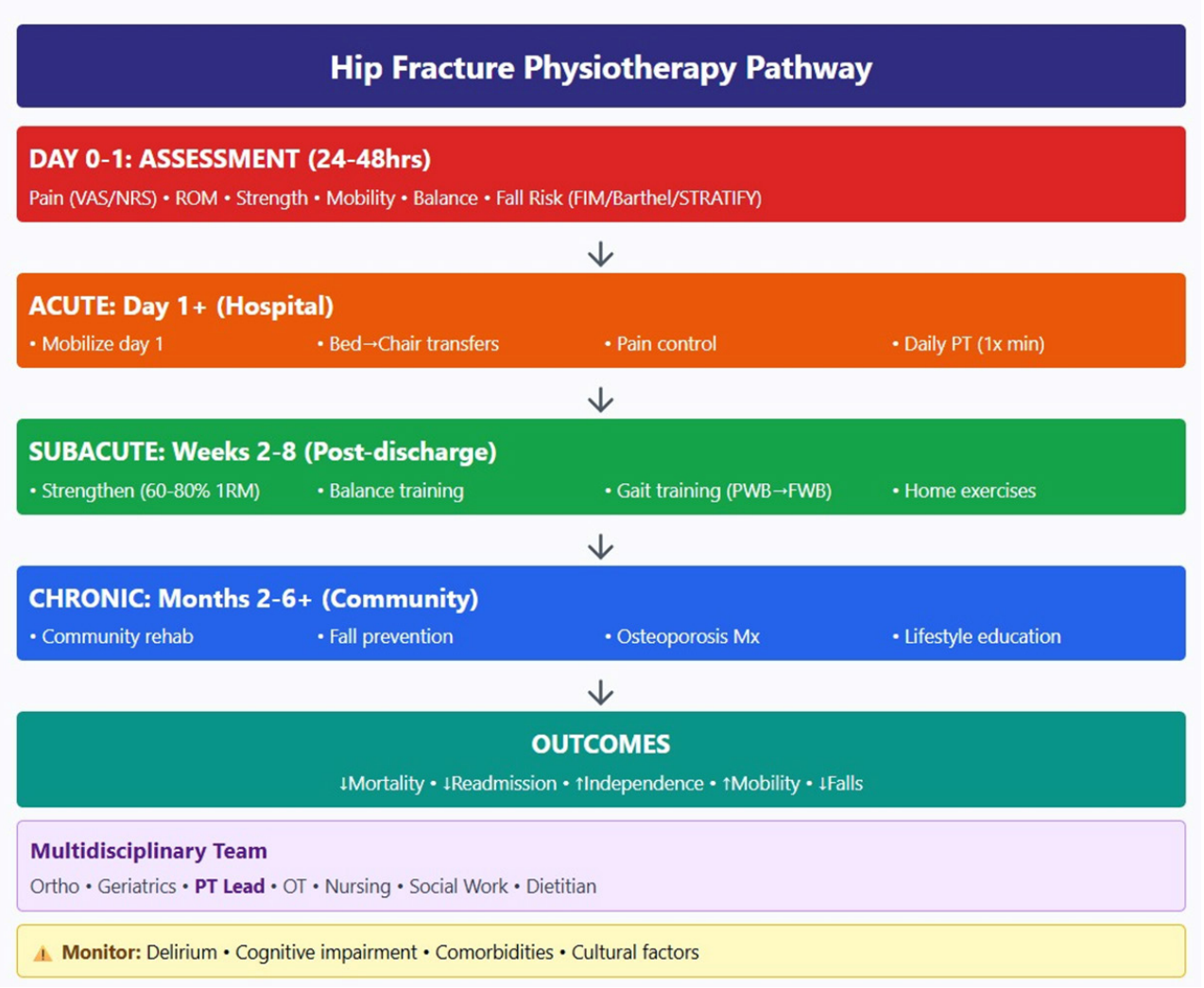

Figure 1 Hip Fracture Physiotherapy Pathway. *PT* Physiotherapy; *ROM* Range of Motion; *Mx* Management; *OT* operation theatre; *PWB* Partial weight bearing; *FWB* full weight bearing; *RM* repetition maximum. Provided by NICE Guidelines.[6]

adults, often requiring surgical fixation (dynamic hip screw, intramedullary nail, or arthroplasty). Rehabilitation plays a critical role in reducing morbidity, restoring function, and preventing secondary complications. Evidence-based physiotherapy interventions differ across the acute, subacute, and chronic phases, and can be further enhanced with innovative rehabilitation strategies.[11] (Figure 1)

Acute Phase (Hospitalization)

Early Mobilization

Patients should begin mobilization within 24–36 hours following surgical fixation or arthroplasty, unless contraindicated. Early out-of-bed activity reduces length of stay, mortality, and postoperative complications. Mobilization protocols emphasize progressive sitting, standing, and short ambulation with appropriate supports. For femoral neck fractures treated with arthroplasty, immediate full weight-bearing is generally encouraged, while unstable intertrochanteric or subtrochanteric fractures may require partial weight-bearing depending on fixation stability.[12]

Bed-to-Chair Transfers

Bed mobility and transfers are introduced as soon as feasible. Techniques such as log rolling and sit-to-stand with frame support are emphasized, ensuring adherence to hip precautions in arthroplasty cases. Transfers are practiced repeatedly throughout the day, with nursing collaboration to promote functional independence.[13]

Pain Management

Effective pain control is crucial to facilitate participation in physiotherapy. Multimodal analgesia (paracetamol, short-acting opioids as needed, and regional nerve blocks such as fascia iliaca block) is recommended. For unstable fractures requiring restricted weight-bearing, pain reduction aids in tolerance of bed exercises and transfers, while in arthroplasty patients, analgesia supports early gait training.[14]

NICE Guidance

According to NICE CG124, all patients should be assessed by a physiotherapist and mobilized the day

after surgery, with therapy provided at least once daily. Analgesia should prioritize paracetamol and immediate release opioids, when necessary, with nerve blocks considered to minimize opioid burden. Early multidisciplinary involvement is strongly emphasized.[6]

Subacute Phase (Post-Discharge)

Following discharge, rehabilitation focuses on restoring muscle strength, balance, gait, and independence. (Figure 2)

Strengthening

Targeted strengthening of quadriceps, gluteals, and calf muscles through progressive resistance exercises (sit-to-stand, mini-squats, step-ups) is essential. For subtrochanteric fractures fixed with intramedullary nails, gradual load progression is critical to avoid implant failure.[15]

Balance and Proprioception

Exercises such as tandem stance, single-leg stance, and dynamic reaching improve postural control. These are particularly important for intertrochanteric fracture patients, who often exhibit prolonged gait instability due to muscle weakness and fear of falling.[16]

Gait Training and Assistive Devices

Walking re-education is central to recovery. Use of walking frames, crutches, or sticks is individualized according to fracture type and surgical stability.

Progression from partial to full weight-bearing is guided by surgeon recommendations, especially in unstable subtrochanteric fractures. Dual-task gait training (walking while performing cognitive tasks) may enhance community mobility and confidence.[17]

Chronic Phase (Long-Term Rehabilitation)

Community Rehabilitation

Community-based physiotherapy ensures continuity of care, focusing on long-term function, participation, and reintegration into daily activities. Programs include supervised group classes or home visits tailored to fracture type and comorbidities.[18]

Fall Prevention

Education on environmental safety, vision correction, footwear, and balance training reduce risk of recurrent falls. Fall prevention is crucial for osteoporotic femoral neck fractures, where recurrence risk is high.[19]

Osteoporosis Management

Patients with low-energy proximal hip fractures should undergo assessment and management for osteoporosis (pharmacological treatment, nutrition, and weight-bearing exercises). Weight-bearing activities also reduce the risk of contralateral hip fracture.[20]

Lifestyle Education

Education on smoking cessation, nutrition, and physical activity supports long-term bone health and functional outcomes. Patient and caregiver training reduces dependency and improves quality of life.[21]

Innovative Therapies

Progressive resistance training using machine or elastic-based exercises, performed 2–3 sessions per week, improves muscle strength and functional

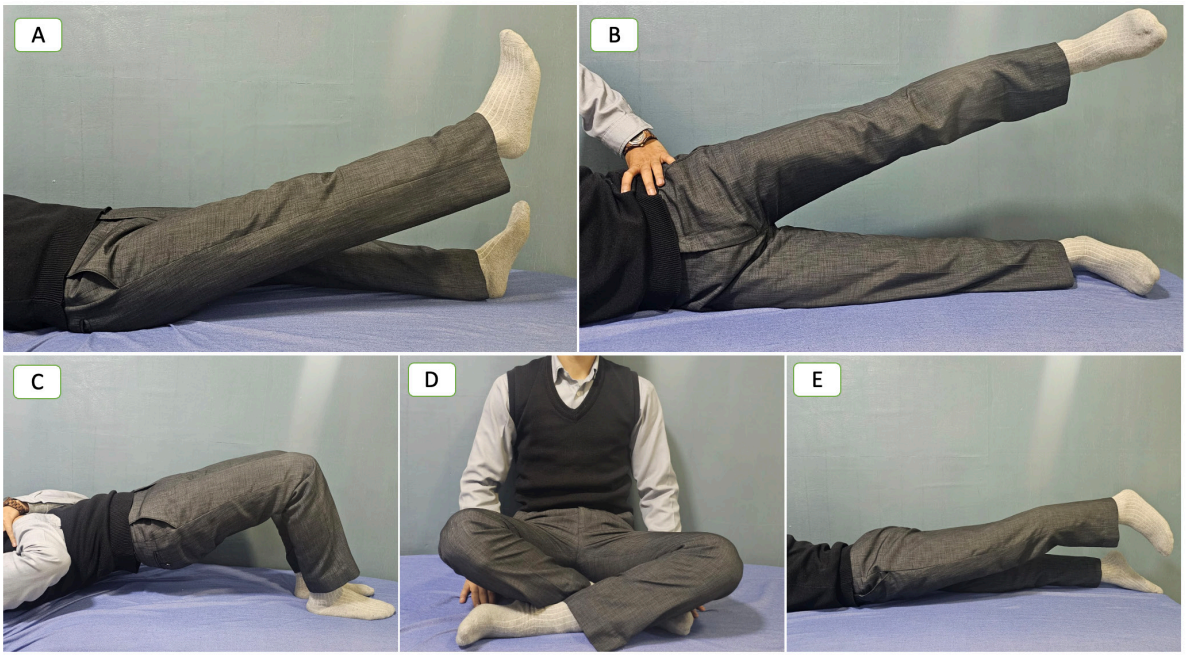

Figure 2 A) Supine Leg Raise: to strengthen the quadriceps and hip flexors. B) Side lying hip abduction: to strengthen the abductors; C) Bridging exercises: to strengthen core muscles; D) Cross leg sitting: to stretch joint capsule; E) Prone lying extension: to strengthen gluteus maximus (hip extensor)

recovery post-hip fracture.[22] Dual-task training, which involves gait training with cognitive or motor tasks, enhances balance and reduces fall risk in elderly patients.[23]Body-weight supported treadmill walking promotes gait symmetry, especially in unstable fracture recovery.[24]Home-based telerehabilitation through remote physiotherapy via digital platforms increases adherence and reduces hospital visits, particularly relevant in the post-COVID era.[25]

Multidisciplinary Approach

Team Composition

The multidisciplinary team approach represents the gold standard for hip fracture management, reflecting the complex nature of the condition and the diverse expertise required for optimal patient outcomes. Recommendations emphasize the importance of early surgery and coordinating care through a multidisciplinary approach.[26]The core team composition includes orthopedic surgeons, geriatricians, physiotherapists, occupational therapists, nurses, social workers, and dietitians, each contributing specialized knowledge and skills essential for comprehensive care.

Orthopedic surgeons provide surgical expertise, define fixation methods, and set weight-bearing restrictions, adjusting precautions as healing progresses. Geriatricians manage age-related conditions, comorbidities, and medication optimization to maximize recovery potential. Physiotherapists lead mobility restoration, strength training, balance improvement, functional rehabilitation, education, and discharge planning.[27]Occupational therapists address activities of daily living, home safety, cognition, and adaptive equipment use. Nurses ensure wound care, medication delivery, patient safety, and consistent rehabilitation protocol adherence. Social workers coordinate discharge, family support, and community reintegration. Dietitians, pharmacists, pain specialists, and mental health professionals further enhance holistic recovery.[28]

Collaborative Care

Effective collaborative care in hip fracture rehabilitation relies on structured communication, shared documentation, and integrated care pathways. Weekly multidisciplinary meetings align goals, review progress, and coordinate discharge, with more frequent communication for complex cases. Standardized rehabilitation pathways outline pre-operative optimization, post-operative protocols, progressive rehabilitation phases, and discharge planning, clarifying team roles and minimizing overlap.[29]Electronic health records with multidisciplinary access support real-time information sharing, while clear urgent communication protocols ensure rapid response to safety concerns. Evidence shows early mobilization and intensive physiotherapy improve recovery and shorten hospital stays.[30]

Role of Physiotherapists

Physiotherapists hold a central leadership role in hip fracture rehabilitation, advocating for mobility and functional recovery. Their expertise in movement science and exercise physiology guides team discussions on functional goals, activity progression, and discharge readiness. They champion evidence-based practices, especially early mobilization and progressive rehabilitation, while coordinating therapy schedules to ensure consistent delivery. Key responsibilities include patient education on safe movement, fall prevention, bone health, and long-term exercise adherence. Empowerment strategies foster confidence, independence, and gradual progression. Continuous professional development sustains physiotherapists' leadership and evidence-based practice delivery.[31]

Special Considerations

Geriatric and Pediatric

Older adults with hip fracture are more likely to present with sarcopenia, osteoporosis, balance impairment, and multimorbidity, all of which reduce functional recovery. Cognitive impairment is common, affecting up to 40% of older hip fracture patients, and is associated with delayed rehabilitation, reduced mobility, and higher institutionalization rates. Rehabilitation strategies should include simplified instructions, structured routines, and caregiver engagement to facilitate adherence despite cognitive limitations.[32]

Post-operative delirium (POD) is a frequent complication, with an incidence between 20–35% after hip fracture surgery. It is associated with prolonged hospitalisation, functional decline, falls, and mortality. Preventive interventions include early mobilisation, frequent re-orientation, sensory aids (glasses, hearing aids), pain management, hydration, and regulation of sleep–wake cycles. Physiotherapists contribute by ensuring mobilisation is started within 24–48 hours and embedding orientation strategies into each therapy session.[33]

In pediatric patients, proximal femoral fractures are rare but carry risks of avascular necrosis (AVN), coxa vara, and growth disturbance due to physeal involvement and vascular compromise. Rehabilitation must respect strict weight-bearing precautions and gradual progression after fixation. Play-based therapy, shorter sessions, and family participation are essential for adherence, while long-term follow-up is necessary to monitor for AVN and growth abnormalities.[34]

Comorbidities

Diabetes and cardiovascular disease (CVD) complicate hip fracture rehabilitation. Diabetes delays healing, increases infection risk, and impairs recovery, while CVD reduces aerobic capacity and exercise tolerance. Physiotherapists must monitor vitals, skin integrity, and progress cautiously. Coexisting conditions demand individualized, multidisciplinary, and paced rehabilitation to ensure safe, effective recovery outcomes.[35]

Cultural and Socioeconomic Factors

Socioeconomic status (SES) and cultural context affect hip fracture rehabilitation. Low-income patients face limited physiotherapy access, transport barriers, and reduced support. Cultural beliefs favoring rest or traditional healing may hinder adherence. Culturally sensitive, evidence-based physiotherapy, early mobilisation, and caregiver education improve access, engagement, and functional recovery.[36]

NICE Guidelines

Overview

The NICE Clinical Guideline 124 offers evidence-based recommendations for adult hip fracture management, setting the international standard. It advises physiotherapy assessment and, unless contraindicated, mobilisation the day after surgery, establishing immediate post-operative rehabilitation as standard. Key recommendations include daily physiotherapy, progressive weight-bearing, transfer and mobility training, balance and strength exercises, fall prevention education, and structured discharge planning. Early intervention is critical, as delays worsen functional outcomes and increase complications. Guidelines emphasize individualized care while maintaining core principles. Supported by systematic reviews, randomised controlled trials (RCTs), and expert consensus, NICE ensures rehabilitation practices are evidence-based and updated with emerging best practices.[6]

Quality Standards

NICE Quality Standard 16 defines performance indicators for hip fracture rehabilitation, ensuring consistent, measurable care. Patients should receive daily rehabilitation during hospitalization, provided by physiotherapists or other multidisciplinary team members when needed. Physiotherapy assessment should occur within 24 hours of surgery, with mobilisation beginning the following day unless contraindicated. Early, systematic rehabilitation improves functional outcomes and shortens hospital stay. Quality indicators include timely assessment, mobilisation within 48 hours, discharge outcomes, functional independence, and length of stay, allowing services to track performance and guide improvements.[6]

Physiotherapy Management of Hip Fractures in Nepal

Healthcare Infrastructure

Nepal's healthcare system exhibits a stark contrast between urban and rural areas. Urban centers such as Kathmandu generally have better access to hospitals and physiotherapy services, whereas rural regions often face severe limitations. Many rural patients do not receive adequate post-operative physiotherapy due to limited infrastructure and a shortage of trained professionals.[37]This disparity is further compounded by geographic barriers and insufficient healthcare policy support.[38]

Cultural Considerations

Cultural beliefs significantly influence patient engagement in rehabilitation. In Nepal, traditional healing methods—such as herbal remedies or spiritual therapies—are commonly preferred, which can conflict with evidence-based physiotherapy interventions. Integrating traditional practices with modern physiotherapy strategies improves compliance and overall outcomes. Recognizing and respecting cultural beliefs is essential in designing rehabilitation plans for hip fracture patients.[39]

Challenges

The physiotherapy sector in Nepal faces several challenges. Many physiotherapists report insufficient training and a lack of institutional support, which hinders evidence-based practice. Moreover, rehabilitation equipment and facilities are often limited, and public awareness regarding the benefits of physiotherapy remains low. Consequently, patients frequently underutilize physiotherapy services post-hip fracture.[37]

Opportunities

Despite these challenges, there are notable opportunities to enhance physiotherapy services. Community-based rehabilitation programs have demonstrated positive outcomes for patients with musculoskeletal impairments. Structured rehabilitation protocols provided significant functional gains in earthquake survivors, suggesting that similar approaches could benefit hip fracture patients.[40] Additionally, Nepal's experience with natural disasters underscores the important role of physiotherapists in emergency response. The Nepal Physiotherapy Association's involvement in post-earthquake rehabilitation highlights how integrating physiotherapy into disaster preparedness and response can ensure timely and effective rehabilitation, even under crisis conditions.[40]

Future Directions & Research

Emerging Therapies

The integration of technology into physiotherapy is transforming hip fracture rehabilitation. Tele-rehabilitation enables remote monitoring and guidance, allowing patients in rural Nepal to access structured exercise programs without frequent hospital visits. Digital tools, including mobile apps and wearable sensors, facilitate real-time feedback, adherence tracking, and progress monitoring.[41] Robotic-assisted physiotherapy, though limited in Nepal, shows promise in enhancing strength, balance, and gait recovery by providing repetitive, controlled movements that reduce therapist fatigue and improve functional outcomes.[42] These innovations can complement traditional physiotherapy, particularly for patients with mobility or transportation limitations.

Research Gaps

Despite advances, there is a lack of high-quality, locally relevant research

on hip fracture rehabilitation in Nepal. Few studies address long-term functional outcomes, patient adherence, or quality-of-life improvements post-rehabilitation. Additionally, economic evaluations are scarce, limiting understanding of cost-effectiveness of physiotherapy interventions. Addressing these gaps is critical to inform evidence-based practices, optimize resource allocation, and develop culturally adapted rehabilitation protocols for the Nepali population.

Conclusion

Hip fracture rehabilitation requires a comprehensive, evidence-based approach that integrates early mobilization, progressive strengthening, balance training, and multidisciplinary collaboration. Physiotherapists play a central leadership role in restoring mobility, preventing complications, and empowering patients toward functional independence. While international guidelines such as NICE provide a robust framework for optimal care, contextual adaptations are essential for resource-limited settings like Nepal, where cultural sensitivity, community-based programs, and innovative technologies such as telerehabilitation offer promising pathways to improve access and outcomes. Addressing research gaps, enhancing professional training, and integrating traditional practices with evidence-based interventions will further strengthen hip fracture rehabilitation services and improve quality of life for patients globally.

Figure 3 A) Recumbent cycling: low impactful workout; B) Gait training; C) Squatting: Hip ROM; D) wall squat: to strengthen quadriceps

Conflict of Interest

None

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