

Rehabilitation-Related Errors and Their Impact on Patient Safety: A Narrative Review

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Abstract

Background: Rehabilitation plays a vital role in improving functional recovery and quality of life. However, rehabilitation-related errors may delay recovery, increase healthcare costs, and compromise patient safety.

Objective: To review rehabilitation-related errors, examine their impact on patient safety, and summarize evidence-based strategies for preventing adverse events in rehabilitation settings.

Methods: A narrative review was conducted using major electronic databases and relevant clinical guidelines, systematic reviews, observational studies, and reports from international organizations.

Results: Rehabilitation-related errors were classified into assessment, treatment, falls, equipment, communication, human factor, and organizational errors. These events may result in physical injury, delayed recovery, reduced functional independence, and increased healthcare utilization. Comprehensive assessment, standardized safety protocols, multidisciplinary communication, staff education, and appropriate equipment management were consistently identified as key strategies for improving patient safety.

Conclusion: Rehabilitation-related errors remain an under-recognized patient safety concern. Implementing evidence-based safety practices and promoting multidisciplinary collaboration may reduce preventable adverse events and improve rehabilitation outcomes.

Keywords: Rehabilitation; Patient Safety; Rehabilitation Errors; Adverse Events; Physical Therapy; Falls Prevention; Human Factors.

1. INTRODUCTION

Rehabilitation is an essential component of modern healthcare that aims to restore physical, cognitive, psychological, and social function following illness, injury, surgery, or disability. It plays a fundamental role in maximizing independence, improving quality of life, reducing long-term disability, and facilitating community reintegration across all age groups. Rehabilitation services encompass a broad spectrum of patient populations, including individuals recovering from traumatic injuries, neurological disorders, orthopedic conditions, spinal cord injuries, stroke, amputations, chronic musculoskeletal diseases, and age-related functional decline. As life expectancy increases and survival following trauma and critical illness continues to improve, the global demand for rehabilitation services has grown substantially, making rehabilitation an integral part of healthcare systems worldwide (1–4).

Rehabilitation is inherently multidisciplinary, requiring close collaboration between physiatrists, physical therapists, occupational therapists, speech and language therapists, rehabilitation nurses, psychologists, prosthetists, orthotists, and other healthcare professionals. Successful rehabilitation depends not only on evidence-based therapeutic interventions but also on accurate patient assessment, individualized treatment planning, continuous monitoring of functional progress, effective communication among team members, and active patient participation throughout the recovery process (5–6).

Despite its well-established benefits, rehabilitation is not without risk. Adverse events occurring during rehabilitation may delay recovery, increase healthcare costs, prolong disability, reduce patient confidence, and negatively affect long-term functional outcomes.

Common rehabilitation-related errors include inaccurate functional assessment, inappropriate exercise prescription, premature progression of weight-bearing activities, patient falls, misuse of assistive devices, inadequate supervision, communication failures, and delayed recognition of medical deterioration. Many of these incidents are preventable and arise from deficiencies in clinical practice, organizational processes, or human factors (7–9).

Patient safety has become a global healthcare priority, with increasing recognition that preventable harm remains a significant contributor to morbidity, mortality, and healthcare expenditure. Although patient safety has been extensively investigated in acute care settings such as intensive care units, emergency medicine, and surgery, comparatively less attention has been directed toward rehabilitation medicine. Rehabilitation presents unique safety challenges because patients often perform physically demanding activities while experiencing impaired mobility, muscle weakness, pain, sensory deficits, cognitive impairment, or balance disorders, all of which increase their susceptibility to adverse events (10–11).

Current evidence addressing rehabilitation-related errors remains fragmented across different clinical specialties and patient populations. Most published studies focus on specific adverse events, such as falls or exercise-related injuries, rather than providing a comprehensive patient safety framework that integrates assessment, treatment, communication, equipment use, and human factors. Therefore, this narrative review aims to synthesize the available evidence, classify common rehabilitation-related errors, examine their consequences on patient outcomes, and summarize evidence-based strategies to improve patient safety across rehabilitation settings (12–13).

2. Problem Statement

Despite the increasing importance of rehabilitation in modern healthcare, patient safety within rehabilitation settings remains an under-recognized area compared with acute care specialties such as intensive care, surgery, and emergency medicine. Although rehabilitation interventions are generally considered safe, preventable adverse events continue to occur throughout the rehabilitation process and may significantly delay functional recovery, increase healthcare costs, prolong hospital stays, and reduce patients' quality of life (10–13).

Rehabilitation-related errors can occur during multiple stages of patient care, including initial assessment, treatment planning, therapeutic intervention, mobility training, transfer techniques, prescription of assistive devices, interdisciplinary communication, and discharge planning. These errors are frequently associated with inadequate patient assessment, inappropriate exercise prescription, insufficient supervision, incorrect use of rehabilitation equipment, environmental hazards, ineffective communication among healthcare professionals, and organizational factors such as staffing shortages and inconsistent adherence to rehabilitation protocols (5–13).

Unlike medication errors or surgical complications, rehabilitation-related adverse events are often underreported because many incidents are perceived as minor or inevitable consequences of therapy. However, even seemingly minor events, such as patient falls, overuse injuries, delayed recognition of clinical deterioration, or inappropriate progression of rehabilitation exercises, may result in fractures, joint injuries, prolonged disability, psychological distress, delayed discharge, or permanent functional decline (7–13).

Furthermore, the current literature primarily focuses on isolated rehabilitation complications, particularly falls or specific neurological or orthopedic conditions, while relatively few publications provide a comprehensive patient safety framework that integrates assessment errors, treatment-related errors, equipment failures, communication breakdowns, human factors, and evidence-based prevention strategies applicable across different rehabilitation populations. This fragmentation limits clinicians' ability to systematically identify safety risks and implement standardized preventive measures (1–13).

Therefore, there is a need for a comprehensive narrative review that classifies rehabilitation-related errors, summarizes their underlying causes and clinical consequences, and translates current evidence into practical patient safety recommendations that can support rehabilitation professionals in delivering safer, higher-quality care across diverse rehabilitation settings.

3. Aim and Objectives

3.1 Aim

To review rehabilitation-related errors and evaluate their impact on patient safety, functional outcomes, and quality of rehabilitation care while summarizing evidence-based strategies for preventing preventable adverse events across rehabilitation settings.

3.2 Objectives

- To classify rehabilitation-related errors into assessment-, treatment-, equipment-, communication-, and human factor-related domains.
- To summarize the mechanisms through which rehabilitation errors contribute to patient harm, delayed recovery, prolonged disability, and reduced functional outcomes.
- To identify common adverse events occurring during neurological, orthopedic, geriatric, trauma, pediatric, and musculoskeletal rehabilitation.
- To evaluate evidence-based interventions that improve rehabilitation safety, including standardized assessment tools, patient monitoring, multidisciplinary communication, environmental modifications, and rehabilitation safety protocols.
- To provide practical recommendations, clinical tables, and a Rehabilitation Safety Checklist that may support quality improvement initiatives in rehabilitation practice.

4. Search Strategy

This narrative review was conducted to summarize the current evidence regarding rehabilitation-related errors and their implications for patient safety across different rehabilitation settings. A comprehensive literature search was performed using major electronic databases, including **PubMed, Scopus, Web of Science, CINAHL, and Google Scholar**. The search strategy combined Medical Subject Headings (MeSH) and free-text keywords related to rehabilitation and patient safety, including rehabilitation, physical therapy, occupational therapy, patient safety, medical errors, adverse events, falls, rehabilitation complications, human factors, assistive devices, and quality of care.

Articles published in English that investigated rehabilitation-related adverse events, patient safety, rehabilitation errors, fall prevention, communication failures, equipment-related incidents, and safety improvement strategies were considered eligible. Studies involving neurological, orthopedic, trauma, geriatric, pediatric, musculoskeletal, cardiopulmonary, and multidisciplinary rehabilitation were included to provide a broad overview of rehabilitation safety across different patient populations.

Narrative reviews, systematic reviews, clinical guidelines, observational studies, randomized controlled trials, and reports published by international organizations such as the World Health Organization (WHO) and the Agency for Healthcare Research and Quality (AHRQ) were included where relevant. Editorials, conference abstracts without sufficient methodological details, and non-English publications were excluded.

The selected literature was reviewed and synthesized narratively rather than quantitatively because of substantial heterogeneity in study designs, rehabilitation settings, patient populations, reported adverse events, and outcome measures. The evidence was organized into major themes describing rehabilitation-related errors, contributing factors, clinical consequences, and evidence-based strategies to improve patient safety in rehabilitation

practice.

5. Classification of Rehabilitation-Related Errors

Rehabilitation-related errors encompass a wide range of preventable incidents that may occur throughout the rehabilitation process. Unlike errors in acute medical care, rehabilitation errors frequently arise during functional assessment, therapeutic interventions, patient mobility training, use of rehabilitation equipment, interdisciplinary communication, and long-term follow-up. These errors often result from a combination of patient-related factors, healthcare provider performance, environmental conditions, organizational systems, and human factors. Because rehabilitation involves repetitive physical interaction between patients and healthcare professionals, even minor errors may adversely affect recovery, increase disability, delay discharge, or reduce patient confidence in rehabilitation programs (10–13).

Current literature suggests that rehabilitation-related adverse events are multifactorial and should not be viewed as isolated incidents. Instead, they represent failures within a complex rehabilitation system in which patient characteristics, clinical decision-making, communication, equipment, and organizational culture interact to influence patient safety. A systematic classification of these errors helps clinicians recognize potential risks, implement targeted preventive strategies, and establish standardized rehabilitation safety practices (10–13). The major categories of rehabilitation-related errors identified in the literature are summarized in **Table 1**.

Category	Examples of Errors	Potential Consequences
Assessment Errors	Incomplete functional assessment, inaccurate balance evaluation, failure to identify fall risk, poor cognitive assessment	Incorrect rehabilitation plan, delayed recovery, increased complications
Treatment Errors	Inappropriate exercise intensity, incorrect progression, excessive loading, inadequate monitoring during therapy	Pain, muscle injury, fractures, delayed rehabilitation
Mobility and Transfer Errors	Unsafe transfer techniques, incorrect gait training, poor wheelchair handling	Falls, fractures, soft tissue injuries
Falls During Rehabilitation	Unsupervised ambulation, environmental hazards, poor balance support	Head injury, fractures, prolonged hospitalization
Equipment and Assistive Device Errors	Improper wheelchair adjustment, poorly fitted walking aids, malfunctioning rehabilitation equipment	Falls, skin injury, loss of mobility
Communication Errors	Inadequate handover, incomplete documentation, poor interdisciplinary communication	Delayed treatment, duplicated therapy, patient harm
Human Factor Errors	Fatigue, inexperience, distraction, poor clinical judgment, inadequate supervision	Increased clinical errors and reduced patient safety
Organizational Errors	Staff shortages, inadequate training, absence of rehabilitation safety protocols	Increased adverse events and inconsistent quality of care

This classification demonstrates that rehabilitation safety extends beyond therapeutic interventions alone. Effective patient safety requires accurate clinical assessment, evidence-based treatment planning, appropriate supervision, safe equipment use, effective teamwork, and organizational support. Understanding these categories provides the foundation for identifying specific risk factors and implementing targeted strategies to reduce preventable adverse events throughout the rehabilitation continuum (10–13).

6. Assessment Errors

Accurate patient assessment is the cornerstone of safe and effective rehabilitation. Errors during the assessment phase may lead to inappropriate rehabilitation goals, unsuitable therapeutic interventions, delayed recovery, and preventable adverse events. Rehabilitation assessment extends beyond diagnosis and includes evaluation of functional capacity, mobility, muscle strength, balance, cognition, pain, communication ability, cardiovascular tolerance, environmental barriers, and psychosocial factors. Failure to perform a comprehensive assessment increases the likelihood of patient harm and compromises rehabilitation outcomes **(5,6,10–13)**.

One of the most common assessment errors is the failure to identify patients at high risk of falls. Inadequate balance assessment, omission of gait evaluation, or failure to recognize previous fall history may expose patients to preventable injuries during rehabilitation sessions. Similarly, overlooking cognitive impairment or reduced safety awareness may result in inappropriate levels of patient independence during mobility training **(7,8)**.

In orthopedic rehabilitation, inaccurate evaluation of weight-bearing status, joint stability, or postoperative restrictions may lead to premature loading, delayed tissue healing, implant failure, or reinjury. Likewise, in neurological rehabilitation, failure to recognize spasticity, neglect, sensory deficits, or communication disorders may significantly reduce treatment effectiveness and increase safety risks during therapy **(6)**.

Assessment errors may also occur when clinicians fail to monitor physiological responses to rehabilitation interventions. Patients with cardiopulmonary disease, frailty, or multiple comorbidities require careful monitoring of heart rate, blood pressure, oxygen saturation, fatigue, and exercise tolerance throughout rehabilitation. Inadequate physiological assessment may result in exercise intolerance, cardiovascular complications, or delayed recognition of clinical deterioration **(10–13)**.

To minimize assessment-related errors, rehabilitation professionals should use standardized assessment tools, perform comprehensive multidisciplinary evaluations, reassess patients regularly, and document functional changes throughout the rehabilitation process. Structured assessment improves clinical decision-making, facilitates individualized rehabilitation planning, and enhances overall patient safety.

Table 2. Common Assessment Errors in Rehabilitation

Assessment Error	Potential Risk	Prevention Strategy
Incomplete functional assessment	Inappropriate rehabilitation plan	Comprehensive multidisciplinary assessment
Failure to identify fall risk	Falls and fractures	Standardized fall-risk screening
Inaccurate balance assessment	Unsafe mobility training	Validated balance assessment tools
Failure to assess cognition	Unsafe independent activities	Routine cognitive screening
Incorrect weight-bearing assessment	Delayed healing or reinjury	Adherence to surgical and orthopedic protocols
Inadequate physiological assessment	Cardiovascular or respiratory complications	Continuous monitoring of vital signs and exercise tolerance

7. Treatment Errors

Therapeutic interventions represent the core of rehabilitation practice and play a fundamental role in restoring functional independence. However, inappropriate therapeutic decision-making or poor implementation of rehabilitation interventions may expose

patients to preventable adverse events. Treatment-related errors may occur during exercise prescription, manual therapy, gait training, transfer practice, functional task training, or progression of rehabilitation programs. These errors may delay recovery, worsen existing impairments, increase pain, or lead to secondary injuries (5,6,10–13).

One of the most frequently reported treatment errors is prescribing exercises that exceed the patient's current functional capacity. Excessive exercise intensity, inappropriate resistance, prolonged treatment duration, or rapid progression without adequate clinical justification may result in muscle strains, joint injuries, excessive fatigue, delayed tissue healing, and reduced patient adherence to rehabilitation programs. Conversely, insufficient exercise intensity may also compromise rehabilitation outcomes by limiting functional improvement and prolonging disability (6).

Incorrect progression of mobility training represents another important source of rehabilitation-related harm. Advancing patients to unsupported standing, ambulation, stair climbing, or balance exercises before achieving adequate muscle strength, postural control, or cardiovascular stability substantially increases the risk of falls and musculoskeletal injuries. Safe progression should always be individualized according to standardized functional assessments rather than predetermined rehabilitation timelines (7,8).

Treatment errors may also arise from inadequate monitoring during rehabilitation sessions. Failure to recognize signs of pain, dizziness, cardiovascular instability, respiratory distress, excessive fatigue, or neurological deterioration may delay appropriate clinical intervention and increase patient harm. Continuous observation of patient responses allows rehabilitation professionals to modify treatment intensity and terminate unsafe interventions when necessary (10–13).

Furthermore, inadequate communication between rehabilitation professionals may contribute to inconsistent treatment plans, duplication of therapy, conflicting exercise prescriptions, and failure to comply with postoperative precautions or medical restrictions. Effective interdisciplinary collaboration remains essential for maintaining treatment consistency and ensuring patient safety throughout the rehabilitation process (10–13).

Implementing evidence-based rehabilitation protocols, individualized exercise prescription, continuous patient monitoring, multidisciplinary communication, and regular reassessment can substantially reduce treatment-related errors while optimizing functional recovery and improving overall rehabilitation quality.

Table 3. Common Treatment Errors in Rehabilitation

Treatment Error	Potential Consequences	Prevention Strategy
Excessive exercise intensity	Muscle injury, pain, fatigue	Individualized exercise prescription
Rapid progression of rehabilitation	Falls, reinjury, delayed healing	Gradual progression based on functional assessment
Inadequate monitoring during therapy	Delayed recognition of complications	Continuous clinical observation and vital sign monitoring
Ignoring pain or patient symptoms	Worsening injury and poor rehabilitation outcomes	Modify or discontinue treatment when clinically indicated
Failure to follow postoperative precautions	Implant failure, reinjury, delayed healing	Adherence to surgical rehabilitation protocols
Poor interdisciplinary coordination	Conflicting treatment plans, duplicated therapy	Regular multidisciplinary communication and documentation

8. Falls During Rehabilitation

Falls are among the most frequently reported adverse events in rehabilitation settings and represent a major threat to patient safety. Individuals undergoing rehabilitation often present with impaired balance, reduced muscle strength, gait abnormalities, sensory deficits, cognitive impairment, pain, or decreased cardiovascular endurance, all of which substantially increase the likelihood of falling during therapeutic activities. Although rehabilitation aims to restore mobility and independence, these interventions inevitably expose patients to situations in which the risk of falling is elevated if appropriate safety precautions are not implemented (7,8,14–16).

The causes of falls during rehabilitation are multifactorial and involve an interaction between intrinsic patient factors, environmental hazards, therapist-related factors, and organizational issues. Patient-related risk factors include advanced age, previous history of falls, impaired balance, lower limb weakness, neurological deficits, visual impairment, cognitive dysfunction, medication effects, and fear of falling. Environmental contributors include slippery floors, poor lighting, cluttered treatment areas, inappropriate footwear, and poorly adjusted mobility aids. In addition, inadequate supervision, poor communication among rehabilitation staff, and inappropriate progression of mobility exercises may further increase fall risk (7,8,14,15).

Falls occurring during rehabilitation may result in serious physical and psychological consequences. Physical injuries range from minor bruises to fractures, head trauma, soft tissue injuries, wound complications, and delayed postoperative recovery. Equally important are the psychological effects, including fear of falling, reduced confidence, decreased participation in therapy, prolonged hospitalization, loss of functional independence, and increased healthcare costs. These adverse outcomes may negatively influence both short- and long-term rehabilitation success (8,14–16).

Evidence indicates that most rehabilitation-related falls are preventable through systematic risk assessment and implementation of multifaceted prevention strategies. Standardized fall-risk assessment tools should be performed on admission and repeated throughout rehabilitation to identify changes in patient status. Individualized exercise programs focusing on balance, muscle strengthening, gait training, and functional mobility have demonstrated effectiveness in reducing fall risk. Environmental modifications, appropriate supervision during high-risk activities, staff education, proper use of assistive devices, and active patient engagement in fall prevention further enhance rehabilitation safety (7,8,14–16).

Ultimately, fall prevention should be considered a continuous process integrated into every stage of rehabilitation rather than a single intervention. Establishing a proactive safety culture that emphasizes early identification of fall risks, interdisciplinary communication, and ongoing reassessment is essential for minimizing preventable harm and improving functional outcomes.

Table 4. Common Risk Factors for Falls During Rehabilitation

Risk Factor	Examples	Prevention Strategy
Patient Factors	Advanced age, previous falls, muscle weakness, impaired balance	Comprehensive fall-risk assessment and individualized rehabilitation
Neurological Factors	Stroke, Parkinson's disease, spinal cord injury, cognitive impairment	Close supervision and neurological assessment
Environmental Factors	Slippery floors, poor lighting, clutter, obstacles	Environmental modification and routine safety checks

Equipment Factors	Incorrect walking aid height, wheelchair instability, poorly fitted orthoses	Regular equipment inspection and proper fitting
Therapist-Related Factors	Inadequate supervision, rapid progression of mobility training	Appropriate therapist assistance and gradual progression
Organizational Factors	Staff shortages, inadequate communication, absence of fall prevention protocols	Staff education and standardized fall prevention policies

9. Equipment and Assistive Device Errors

Rehabilitation frequently relies on a wide range of assistive devices and therapeutic equipment to improve mobility, independence, and functional recovery. Commonly used devices include wheelchairs, walkers, crutches, canes, prosthetic limbs, orthoses, transfer aids, balance-training equipment, treadmills, electrical stimulation devices, and robotic rehabilitation systems. Although these technologies provide substantial clinical benefits, inappropriate prescription, incorrect fitting, inadequate maintenance, or improper use may expose patients to preventable adverse events and compromise rehabilitation outcomes (17–20).

One of the most common equipment-related errors is the prescription of inappropriate assistive devices that do not match the patient's physical abilities or rehabilitation goals. Incorrect selection of walking aids may increase energy expenditure, reduce gait stability, and increase fall risk. Likewise, improperly fitted wheelchairs or prosthetic devices may cause pressure injuries, skin breakdown, pain, poor posture, joint deformities, and reduced patient compliance with rehabilitation programs (17,18).

Equipment-related adverse events may also result from inadequate inspection or maintenance of rehabilitation devices. Mechanical failure of wheelchairs, worn walking aid tips, damaged transfer equipment, loose wheelchair brakes, or malfunctioning rehabilitation machines may cause falls or traumatic injuries. Routine equipment inspection and preventive maintenance are therefore essential components of rehabilitation safety programs (18–20).

Another important source of error involves inadequate patient education regarding the safe use of assistive devices. Patients and caregivers who receive insufficient training may incorrectly use mobility aids, transfer devices, or prostheses during daily activities, increasing the risk of falls, joint injuries, and unnecessary dependence on caregivers. Structured education and supervised practice improve both safety and patient confidence during rehabilitation (17–20).

Advances in rehabilitation technology, including robotic-assisted rehabilitation, powered exoskeletons, and virtual reality systems, have introduced new opportunities for functional recovery while simultaneously creating new patient safety challenges. Appropriate clinician training, standardized operating procedures, careful patient selection, and continuous monitoring remain essential for ensuring the safe implementation of advanced rehabilitation technologies (19,20).

Overall, minimizing equipment-related errors requires careful prescription, individualized fitting, regular maintenance, patient education, and ongoing reassessment of device effectiveness throughout the rehabilitation process.

Table 5. Common Equipment and Assistive Device Errors in Rehabilitation

Equipment Error	Potential Consequences	Prevention Strategy
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Incorrect prescription of assistive devices	Poor mobility, falls, reduced independence	Individualized assessment before prescription
Improper fitting of prostheses or orthoses	Skin breakdown, pain, joint deformity	Professional fitting and regular reassessment
Poor wheelchair adjustment	Pressure injuries, posture problems, falls	Wheelchair fitting according to clinical guidelines
Failure to maintain rehabilitation equipment	Equipment malfunction, patient injury	Routine inspection and preventive maintenance
Inadequate patient education	Incorrect device use and increased fall risk	Structured education and supervised training
Unsafe use of robotic rehabilitation devices	Patient injury and equipment- related accidents	Staff competency training and safety protocols

10. Communication and Human Factors

Effective communication and human factors are essential for ensuring patient safety throughout the rehabilitation process. Rehabilitation requires close collaboration among multidisciplinary healthcare professionals, and failures in communication may lead to inappropriate clinical decisions, inconsistent treatment plans, delayed interventions, and preventable patient harm (10–13,21–24).

Communication errors commonly occur during patient handovers, documentation, multidisciplinary meetings, and discharge planning. Incomplete information regarding functional status, rehabilitation goals, or medical restrictions may result in inappropriate therapeutic interventions and compromise patient safety. Standardized communication tools and accurate documentation are therefore critical for maintaining continuity of care (21,22).

Human factors such as fatigue, excessive workload, inexperience, distractions, and inadequate supervision may impair clinical judgment and increase the risk of errors during rehabilitation. Organizational issues, including staff shortages and the absence of standardized rehabilitation protocols, may further contribute to unsafe practice (12,13,23,24).

Improving communication through structured handovers, multidisciplinary teamwork, comprehensive documentation, continuous staff education, and implementation of human factors principles can significantly reduce rehabilitation-related errors and enhance patient safety.

Table 6. Communication and Human Factor-Related Errors

Error Type	Examples	Potential Consequences	Prevention Strategy
Communication Failure	Incomplete handover, poor documentation	Inappropriate treatment, delayed care	Standardized handover tools (e.g., SBAR)
Poor Multidisciplinary Coordination	Conflicting rehabilitation goals	Inconsistent patient management	Regular MDT meetings
Fatigue	Physical and mental exhaustion	Reduced clinical performance	Workload management and adequate staffing
Inexperience	Limited clinical competency	Clinical errors and patient harm	Competency-based education and supervision
Distractions	Interruptions during	Reduced attention	Minimize interruptions during

	therapy	and mistakes	patient care
Weak Safety Culture	Under-reporting of incidents	Recurrent preventable errors	Encourage incident reporting and quality improvement

11. Clinical Consequences of Rehabilitation-Related Errors

Rehabilitation-related errors may result in significant physical, psychological, functional, and economic consequences. Although many incidents are preventable, their impact can delay recovery, prolong rehabilitation, reduce patient independence, and increase healthcare costs (7,8,10,14–24).

Physical consequences include fractures, soft tissue injuries, pressure injuries, delayed wound healing, joint instability, increased pain, and deterioration of existing medical conditions. These complications may prolong hospitalization and delay the achievement of rehabilitation goals (7,8,14–20).

Psychological consequences are equally important. Falls, repeated treatment failures, or adverse events may reduce patient confidence, increase fear of movement or falling, decrease motivation, and negatively affect participation in rehabilitation programs. Reduced engagement in therapy is associated with poorer functional outcomes and lower quality of life (14–16).

From a healthcare perspective, rehabilitation-related errors contribute to increased resource utilization through prolonged hospital stays, additional treatments, increased staff workload, and higher healthcare expenditure. Furthermore, recurrent adverse events may reduce patient satisfaction and compromise the overall quality of rehabilitation services (10–13,21–24).

Recognizing these consequences highlights the importance of early risk identification, standardized safety protocols, multidisciplinary teamwork, and continuous quality improvement to minimize preventable harm during rehabilitation.

Table 7. Clinical Consequences of Rehabilitation-Related Errors

Type of Consequence	Examples	Potential Impact
Physical	Fractures, soft tissue injuries, pressure injuries, pain	Delayed recovery and prolonged rehabilitation
Functional	Reduced mobility, delayed independence, functional decline	Longer rehabilitation duration
Psychological	Fear of falling, anxiety, reduced confidence	Poor participation in therapy
Organizational	Extended hospital stay, increased workload	Reduced healthcare efficiency
Economic	Additional treatment costs and prolonged care	Increased healthcare expenditure

12. Prevention Strategies

Preventing rehabilitation-related errors requires a systematic approach that integrates patient assessment, standardized clinical protocols, effective communication, staff education, and continuous quality improvement. Because most rehabilitation-related adverse events are preventable, implementing evidence-based safety measures can substantially reduce patient harm and improve functional outcomes (10–24).

Comprehensive assessment should be performed before initiating rehabilitation and repeated throughout the patient's recovery to identify changes in functional status and potential safety risks. Individualized rehabilitation programs based on patient needs, medical condition, and functional capacity help reduce inappropriate interventions and treatment-related complications (5–8).

Standardized safety protocols, including fall prevention strategies, safe patient handling procedures, equipment inspection, and appropriate supervision during high-risk activities, are essential components of rehabilitation practice. Regular maintenance of assistive devices and continuous monitoring of patient responses during therapy further reduce the likelihood of adverse events (7,8,17–20).

Multidisciplinary communication also plays a critical role in patient safety. Structured handovers, accurate documentation, regular team meetings, and active patient and caregiver education improve continuity of care and minimize communication-related errors. Furthermore, fostering a positive safety culture that encourages incident reporting, staff training, and continuous quality improvement supports safer rehabilitation services (21–24).

Overall, integrating patient-centered care with standardized safety practices provides the most effective strategy for reducing rehabilitation-related errors and promoting safe, high-quality rehabilitation.

Table 8. Strategies to Prevent Rehabilitation-Related Errors

Strategy	Purpose
Comprehensive patient assessment	Identify individual risk factors before rehabilitation
Individualized rehabilitation plans	Match treatment intensity to patient ability
Standardized fall prevention protocols	Reduce falls and fall-related injuries
Routine equipment inspection	Prevent equipment-related adverse events
Continuous patient monitoring	Detect clinical deterioration early
Structured multidisciplinary communication	Improve coordination and continuity of care
Staff education and competency training	Reduce human factor-related errors
Incident reporting and quality improvement	Identify recurring safety issues and improve practice

13. Rehabilitation Safety Checklist

A structured rehabilitation safety checklist provides a practical approach to minimizing preventable adverse events throughout the rehabilitation process. Incorporating safety checks before, during, and after therapeutic interventions promotes consistent clinical practice, improves communication among rehabilitation professionals, and enhances patient safety. The checklist should be integrated into routine rehabilitation care and adapted according to the patient's clinical condition and rehabilitation goals (10–24).

Table 9. Rehabilitation Safety Checklist

Safety Domain	Checklist Item
Patient Assessment	Confirm patient identity and reassess functional status
Fall Risk	Complete fall-risk assessment before therapy
Medical Stability	Verify vital signs, pain level, and medical restrictions
Equipment	Inspect wheelchairs, walking aids, prostheses, and rehabilitation equipment
Treatment Plan	Confirm rehabilitation goals and appropriate exercise intensity
Communication	Review handover information and multidisciplinary recommendations
Patient Education	Ensure the patient understands the planned intervention and safety precautions

Supervision	Provide appropriate assistance during mobility and high-risk activities
Documentation	Record treatment provided, patient response, and any adverse events

14. Future Directions

Future research should focus on developing standardized definitions for rehabilitation-related errors and establishing national and international reporting systems to improve patient safety surveillance. Large multicenter studies are needed to determine the incidence, causes, and outcomes of rehabilitation-related adverse events across different patient populations and rehabilitation settings.

Emerging technologies, including wearable sensors, artificial intelligence, robotic rehabilitation, and digital health platforms, may improve patient monitoring and early detection of safety risks. Future investigations should evaluate the effectiveness of these innovations in reducing rehabilitation-related errors while maintaining patient-centered care (17–24).

15. CONCLUSION

Rehabilitation-related errors remain an important yet under-recognized patient safety challenge. Errors occurring during assessment, treatment, mobility training, equipment use, communication, and organizational processes may adversely affect functional recovery, prolong disability, and increase healthcare utilization.

This narrative review highlights the multifactorial nature of rehabilitation-related errors and emphasizes the importance of comprehensive assessment, individualized treatment planning, multidisciplinary communication, appropriate equipment management, continuous staff education, and standardized safety protocols. Integrating these evidence-based strategies into routine rehabilitation practice may reduce preventable adverse events, improve functional outcomes, and promote a stronger culture of patient safety across rehabilitation services.

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