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Physiotherapy Management in Older Adults with Partial-Thickness Burn: A Case Report

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Abstract

Background: Burn injury in older adults may cause functional decline, contracture, immobilization, and prolonged rehabilitation, particularly in patients with neurological and respiratory comorbidities. Evidence regarding physiotherapy management in frail geriatric patients with burn injury remains limited.

Objective: To describe physiotherapy assessment, intervention, and serial outcomes in an older adult with partial-thickness burn accompanied by recurrent stroke and bilateral pneumonia.

Methods: A descriptive case report was conducted in an 85-year-old female with left-sided partial-thickness burn involving 13.5% total body surface area. Comorbidities included recurrent stroke with right hemiparesis and bilateral pneumonia. Serial evaluations were performed at baseline (T0), week 3 (T1), and week 6 (T2). Outcomes included pain intensity using Numeric Rating Scale (NRS), range of motion (ROM), muscle strength using Manual Muscle Testing (MMT), and functional ability using the Barthel Index. Physiotherapy interventions consisted of positioning, ROM exercise, stretching, strengthening exercise, breathing exercise, and caregiver education.

Results: Initial assessment demonstrated pain intensity of 2/10 at rest and 5/10 during movement, limited elbow flexion (100°), wrist flexion-extension limitation (15°–30°), and Barthel Index score of 20/100. Serial evaluation from T0 to T2 demonstrated gradual wound healing, increased elbow flexion from 100° to 110°, and mild improvement in muscle strength from 2/5 to 3/5 on MMT without contracture formation. Functional dependency remained stable throughout the rehabilitation period.

Conclusion: Physiotherapy rehabilitation in frail older adults with burn injury and multimorbidity should prioritize prevention of functional decline, maintenance of residual function, and minimization of immobilization-related complications through individualized and family-centered approaches.

Keywords
Burns; Physical Therapy Modalities; Rehabilitation; Activities of Daily Living; Range of Motion, Articular

Introduction

Burn injury is a complex traumatic condition that may affect skin integrity, musculoskeletal function, respiratory capacity, mobility, and overall functional independence. In addition to causing local tissue damage, burn injury may lead to prolonged immobilization, pain, muscle weakness, joint stiffness, contracture formation, respiratory complications, and reduced quality of life, particularly in hospitalized patients.,[1,2] Partial-thickness burn is characterized by injury involving the epidermis and part of the dermis, frequently presenting with erythema, blistering, moist wound surfaces, and substantial pain due to preserved superficial nerve endings.[1] Scald injury remains one of the most common causes of burn injury worldwide, especially among older adults and individuals with impaired mobility or functional limitations.[3]

The severity and rehabilitation complexity of burn injury are influenced not only by burn depth and total body surface area (TBSA), but also by patient age, comorbidities, and pre-existing functional status.[1] Older adults are particularly vulnerable because aging is associated with reduced physiological reserve, sarcopenia, delayed tissue healing, impaired balance, frailty, and increased dependency risk.[4] In geriatric patients, burn injury is frequently associated with prolonged hospitalization, deconditioning, and poorer rehabilitation outcomes compared with younger populations.[5]

Neurological comorbidities such as recurrent stroke may further complicate burn rehabilitation. Stroke-related hemiparesis can reduce mobility, muscle activation, balance control, and participation during rehabilitation programs.[6] Patients with recurrent stroke often present with pre-existing functional limitations and low exercise tolerance, thereby increasing the risk of prolonged immobilization and functional decline following burn injury.[6] Moreover, prolonged bed rest may contribute to respiratory complications, reduced endurance, secretion retention, and hospital-acquired pneumonia, particularly in frail older adults.[7]Bilateral pneumonia may substantially limit rehabilitation progression because patients frequently demonstrate reduced cardiopulmonary tolerance and rapid fatigue during mobilization activities.

Physiotherapy plays an important role throughout burn rehabilitation by preventing contracture, maintaining joint mobility, minimizing immobilization-related complications, improving functional capacity, and supporting gradual reintegration into daily activities.[2] Burn rehabilitation programs commonly include positioning, pressure relief, range of motion (ROM) exercise, stretching, strengthening exercise, respiratory intervention, functional retraining, and caregiver education.[2,6] Early mobilization and exercise-based rehabilitation have been reported to improve muscle strength and physical function in patients with burn injury.[8]However, most available evidence focuses on general burn rehabilitation populations and younger individuals with better functional reserve. Evidence specifically addressing physiotherapy management in frail geriatric patients with burn injury accompanied by recurrent stroke and bilateral pneumonia remains limited.[5,9]

In medically complex geriatric cases, rehabilitation goals may shift from rapid functional restoration toward prevention of further decline, maintenance of residual function, prevention of contracture and pressure injury, and optimization of respiratory tolerance.[9] Family-centered rehabilitation also becomes essential because many frail older adults depend heavily on caregivers for positioning, transfer assistance, exercise continuation, and activities of daily living support after discharge.[9]

Therefore, this case report aimed to describe physiotherapy assessment, intervention, clinical reasoning, and serial rehabilitation outcomes in an older adult with partial-thickness burn following scald injury accompanied by recurrent stroke and bilateral pneumonia. This report highlights the role of individualized and prevention-focused physiotherapy rehabilitation in maintaining functional stability and minimizing immobilization-related complications in frail geriatric patients with multimorbidity.

Methods

This study was designed as a descriptive case report following the CARE (CAse REport) Guideline for clinical case reporting.[10]The report described physiotherapy management in an 85-year-old female with left-sided partial-thickness burn following scald injury accompanied by recurrent stroke with right hemiparesis, bilateral pneumonia, hypertension, and prolonged immobilization. The rehabilitation approach focused on prevention of further functional decline, maintenance of residual function, prevention of contracture and pressure injury, and minimization of immobilization-related complications.

The patient was hospitalized for approximately one month and received conservative wound management without skin graft intervention. Routine pharmacological management included antihypertensive medication, antibiotics, analgesics, and supportive medical treatment according to hospital protocols. During physiotherapy evaluation, the patient was conscious but had limited verbal communication and required caregiver assistance for feeding, transfer, toileting, and mobility activities. The patient had no smoking history and lived with family members who acted as primary caregivers during hospitalization. Clinical observation demonstrated generalized frailty and reduced exercise tolerance.

The patient's clinical management progressed from hospital admission and diagnostic assessment to structured physiotherapy intervention, serial evaluation, continued rehabilitation, and discharge planning. The clinical pathway and rehabilitation timeline are presented in Figure 1.

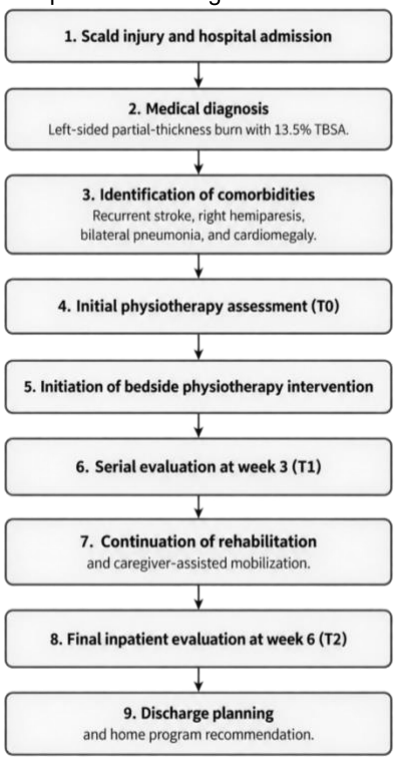

Figure 1. Clinical Timeline of Physiotherapy Management in a Patient with Partial-Thickness Burn and Multiple Comorbidities

Burn severity was assessed clinically based on wound color, moisture, blister formation, pain response, and tissue involvement.[1] Burn extent was estimated using the Rule of Nines method because it is widely used in adult burn assessment.[1] Initial examination demonstrated 4.5% TBSA involvement at the distal humerus and proximal wrist regions and 9% TBSA involvement at the gluteal/hip region, resulting in a total TBSA estimation of 13.5%. Clinically, the wounds presented with erythema, moist wound surfaces, whitish wound margins, and localized darkened areas without evidence of full-thickness eschar formation. Based on burn depth and TBSA involvement, the patient was classified as having moderate partial-thickness burn injury.[11]

Pain intensity was evaluated using the Numeric Rating Scale (NRS) ranging from 0 to 10 during rest, palpation, and active movement.[12]Clinically, pain was interpreted as predominantly originating from active wound irritation and tissue tension during movement rather than central post-stroke pain because symptoms were localized around burn regions and aggravated by palpation and mobilization activities.

Joint range of motion (ROM) was measured using a universal goniometer according to standardized anatomical landmarks and documented using the International SFTR Method of Measuring and Recording Joint Motion (ISOM format). All ROM measurements were performed by the same physiotherapist throughout the rehabilitation period to improve consistency and reduce interobserver variation. Active and passive ROM examinations focused on the shoulder, elbow, wrist, and hip joints. Hip ROM measurement could not be fully quantified during baseline evaluation because severe gluteal pain and prolonged bed rest limited safe movement performance.

Muscle strength was assessed using Manual Muscle Testing (MMT) based on the Medical Research Council (MRC) Scale ranging from 0 to 5.[13] Muscle weakness was interpreted as multifactorial and potentially influenced by burn-related pain, prolonged

immobilization, frailty, and pre-existing neurological deficits due to recurrent stroke. Functional ability was evaluated using the Barthel Index because the patient demonstrated severe dependency in activities of daily living and mobility.

Sensory examination was performed using Light Touch Test and Sharp–Dull Discrimination (Pinprick Test) around burn regions and compared with the contralateral side.[14]Examination findings demonstrated hypersensitivity around burn areas without evidence of progressive sensory deterioration. Formal dermatomal mapping and quantitative sensory grading were not feasible because of limited patient tolerance and communication capacity.

Respiratory assessment included observation of breathing pattern, respiratory rate, sputum production, fatigue response, and tolerance during mobilization because the patient had bilateral pneumonia and prolonged immobilization. Objective respiratory measurements such as chest expansion and pulse oximetry were unavailable in routine physiotherapy documentation; therefore, respiratory findings were interpreted descriptively based on clinical observation.[7]

Additional bedside assessment included posture observation, pressure injury risk assessment, edema observation, and contracture risk evaluation. The patient demonstrated prolonged supine positioning with limited independent repositioning ability, thereby increasing the risk of deconditioning and pressure injury. Mild local edema and flexion positioning tendency were observed around affected upper extremity regions, although no fixed contracture was identified during serial evaluations.

Physiotherapy intervention was delivered bedside according to wound condition, pain response, cardiopulmonary tolerance, neurological deficits, and fatigue level. The intervention program consisted of positioning and pressure relief, ROM exercise, gentle sustained stretching, strengthening exercise, breathing exercise, functional retraining, and caregiver education.

Positioning and pressure relief were performed every two hours to minimize prolonged pressure over the gluteal region and reduce flexion contracture risk. The elbow and wrist were maintained in anti-contracture positioning as tolerated. Family members were trained to assist repositioning and limb support outside therapy sessions.

ROM exercise consisted of passive ROM and active-assisted ROM exercises targeting the shoulder, elbow, wrist, and hip joints within pain-limited tolerance. Exercises were performed in bedside supine positioning with gradual movement progression in sagittal and frontal planes. Each movement was repeated 5–10 times with approximately 5-second end-range hold while monitoring pain response, fatigue, and skin irritation.

Gentle sustained stretching was directed toward periarticular soft tissues around the elbow and wrist without directly stressing active wound surfaces. Stretching was maintained for approximately 15–20 seconds using low-intensity sustained elongation techniques according to burn rehabilitation recommendations.[2]

Strengthening exercise focused on low-intensity active movement and submaximal isometric contraction of the shoulder, elbow, wrist, trunk, and lower extremity musculature. Exercise progression was adjusted according to fatigue tolerance, pain response, and neurological limitation. Functional training included bed mobility exercise, rolling practice, assisted sitting, reaching activities, transfer facilitation, and simulated feeding activities.

Breathing exercise included diaphragmatic breathing, breathing control exercise, thoracic expansion facilitation, and supported coughing techniques performed in comfortable bedside positioning. Respiratory intervention aimed to improve ventilation, reduce secretion retention risk, and minimize pulmonary complications associated with prolonged bed rest and pneumonia.[6,7] Energy conservation strategies and positioning optimization for respiratory comfort were also provided during therapy sessions.

Caregiver education was integrated throughout rehabilitation. Family members received instruction regarding safe repositioning, assisted ROM exercise, pressure relief, breathing exercise assistance, fatigue monitoring, and continuation of simple exercises outside supervised therapy sessions. A home-based continuation program and discharge recommendations were provided before discharge.

All interventions were monitored for adverse events and exercise intolerance. Therapy was terminated if the patient demonstrated excessive pain, bleeding, respiratory distress, severe fatigue, reduced responsiveness, or worsening wound appearance. No major adverse events were documented during supervised physiotherapy sessions.

Data analysis was descriptive and focused on serial clinical interpretation across T0, T1, and T2 evaluations. Changes in wound condition, pain intensity, ROM, muscle strength, respiratory tolerance, sensory findings, and functional ability were interpreted narratively to describe rehabilitation progression over time.

Written informed consent was obtained from the patient's family for anonymous publication of this case report and accompanying clinical information. All identifiable patient information was anonymized according to ethical standards for case reporting.

Results

This case report described serial physiotherapy outcomes in an 85-year-old female with left-sided partial-thickness burn following scald injury accompanied by recurrent stroke with right hemiparesis, bilateral pneumonia, hypertension, and prolonged immobilization. Serial evaluations were performed at baseline (T0), week 3 (T1), and week 6 (T2) to monitor wound condition, pain intensity, joint mobility, muscle strength, sensory findings, respiratory tolerance, and functional ability during inpatient rehabilitation.

Baseline patient characteristics are summarized in Table 1 to provide clinical context regarding multimorbidity, hospitalization status, and functional dependency before physiotherapy intervention. The patient demonstrated severe physical dependency, limited mobility, reduced exercise tolerance, and prolonged bed rest during the initial physiotherapy assessment. These findings supported the implementation of individualized bedside rehabilitation focused on maintenance-oriented intervention and prevention of immobilization-related complications.

Table 1. Baseline Characteristics of the Patient

Parameter	Findings
Age	85 years
Sex	Female
Occupation	Farmer
Diagnosis	Left-sided partial-thickness burn following scald injury
Burn location	Distal humerus, proximal wrist, gluteal/hip region
Burn extent	13.5% TBSA
Comorbidities	Recurrent stroke with right hemiparesis, hypertension, bilateral pneumonia, cardiomegaly
Hospitalization duration	Approximately 1 month
Mobility status	Bed-dependent with caregiver assistance
Communication	Limited verbal communication

Wound management	Conservative wound care without skin graft
Primary rehabilitation goal	Prevention of further decline and maintenance of residual function

Serial wound evaluation demonstrated gradual improvement in burn appearance throughout the rehabilitation period. Clinical progression of wound characteristics from T0 to T2 is presented in Table 2. The evaluation focused on erythema, wound moisture, granulation tissue formation, pain response, and contracture risk because these findings were clinically relevant to physiotherapy progression and tissue healing status.

Table 2. Serial Clinical Evaluation of Burn Wound (T0–T2)

Burn Region	T0 (Baseline)	T1 (Week 3)	T2 (Week 6)
Distal humerus and proximal wrist	Moist wound surface, erythema, whitish wound margins, localized darkened areas, pain during movement and palpation	Reduced erythema, wound surface partially dry, active granulation tissue, no wound expansion	Stable granulation tissue, reduced redness, no secondary infection, no contracture
Gluteal/hip region	Moist erythematous wound with pain during pressure and repositioning	Reduced redness and pain response during repositioning	Stable wound appearance with ongoing healing process

Serial observation demonstrated controlled wound healing progression without evidence of secondary infection, wound deterioration, or fixed contracture formation. Improvement was reflected by reduced erythema, progressive wound drying, and stable granulation tissue development. Although complete wound closure was not achieved during the six-week rehabilitation period, no worsening wound condition or adverse tissue response was observed during physiotherapy intervention.

Pain intensity was monitored serially using the Numeric Rating Scale (NRS) to evaluate symptom progression and exercise tolerance during rehabilitation. Serial pain findings from T0 to T2 are summarized in Table 3.

Table 3. Serial Pain Evaluation Using Numeric Rating Scale (NRS)

Assessment Condition	T0	T1	T2
Resting pain	2/10	2/10	1/10
Pain during palpation	5/10	4/10	4/10
Pain during movement	5/10	4/10	4/10

Serial pain evaluation demonstrated mild improvement in resting pain and movement-related pain during rehabilitation. However, moderate pain remained present during movement and palpation, particularly around the wrist and gluteal regions. Persistent pain findings were clinically consistent with ongoing tissue healing and hypersensitivity associated with partial-thickness burn injury.

Joint mobility was evaluated serially using goniometric measurement to monitor movement limitation and contracture risk. Selected ROM outcomes with clinically meaningful changes are presented in Table 4.

Table 4. Serial Range of Motion (ROM) Evaluation

Joint Movement	T0	T1	T2
Left elbow flexion	100°	105°	110°
Left wrist flexion	15°	20°	20°
Left wrist extension	30°	35°	35°
Hip movement tolerance	Severe limitation due to pain	Moderate limitation	Moderate limitation

Serial ROM evaluation demonstrated mild improvement in elbow flexion and wrist mobility between T0 and T2. The greatest improvement was observed in elbow flexion, whereas wrist mobility remained moderately restricted throughout rehabilitation. Hip evaluation remained limited because gluteal pain and prolonged bed rest restricted safe movement performance. Importantly, no fixed contracture developed during serial evaluation despite prolonged immobilization and flexion positioning tendency.

Muscle strength outcomes were evaluated using Manual Muscle Testing (MMT) to monitor preservation of muscle activation during rehabilitation. Serial MMT findings are summarized in Table 5.

Table 5. Serial Manual Muscle Testing (MMT) Outcomes

Muscle Group	T0	T1	T2
Left shoulder	2/5	2/5	3/5
Left elbow	2/5	2/5	3/5
Left wrist	2–3/5	3/5	3/5
Left hip	4/5	4/5	4/5

Serial muscle strength evaluation demonstrated slight improvement in proximal upper extremity activation at week 6, although substantial weakness remained present throughout rehabilitation. Limited strength progression was likely influenced by advanced age, recurrent stroke, prolonged immobilization, pain-related movement restriction, and reduced exercise endurance.

Sensory examination consistently demonstrated hypersensitivity around burn regions throughout serial evaluation. The patient showed exaggerated responses to light touch and pinprick stimulation at T0, T1, and T2, particularly around the wrist and gluteal regions. No progressive sensory deterioration or neuropathic sensory loss was identified during the rehabilitation period.

Functional ability was monitored serially using the Barthel Index to evaluate dependency status during inpatient rehabilitation. Serial Barthel Index findings are presented in Table 6.

Table 6. Serial Barthel Index Outcomes

Evaluation Time	Total Score	Interpretation
T0	20/100	Severe dependency
T1	20/100	Severe dependency
T2	20/100	Severe dependency

Despite gradual improvement in wound condition and mild improvement in ROM and muscle activation, no measurable improvement was observed in Barthel Index score throughout the six-week rehabilitation period. Clinically, this outcome reflected persistent severe dependency associated with recurrent stroke, frailty, bilateral pneumonia, prolonged bed rest, low endurance, and pre-existing neurological impairment. Nevertheless, the absence of further functional decline during prolonged hospitalization was interpreted as a clinically meaningful rehabilitation outcome in this frail geriatric patient.

Respiratory monitoring demonstrated reduced endurance and limited tolerance to mobilization activities throughout rehabilitation. At baseline, the patient demonstrated shallow breathing pattern, productive cough episodes, and rapid fatigue during repositioning activities consistent with bilateral pneumonia. Mild improvement in breathing comfort and exercise tolerance was observed at T1 and T2 following breathing exercise and positioning intervention, although prolonged sitting and transfer activities remained significantly limited. Objective respiratory outcomes such as chest expansion and pulse oximetry were unavailable during routine physiotherapy documentation.

Throughout the rehabilitation period, all physiotherapy interventions were performed bedside according to symptom tolerance and medical stability. No major adverse events such as wound bleeding, respiratory deterioration, syncope, or hemodynamic instability were documented during supervised therapy sessions. Family members progressively became able to assist repositioning, passive ROM exercise, and pressure relief techniques independently following caregiver education sessions.

The patient was evaluated at three time points: initial assessment (T0), follow-up assessment at week 3 (T1), and final assessment at week 6 (T2). The clinical course demonstrated progressive wound healing, mild improvement in range of motion and upper extremity strength, stable respiratory tolerance, and maintenance of residual functional capacity, although severe dependency persisted. The assessment progression is presented in Figure 2.

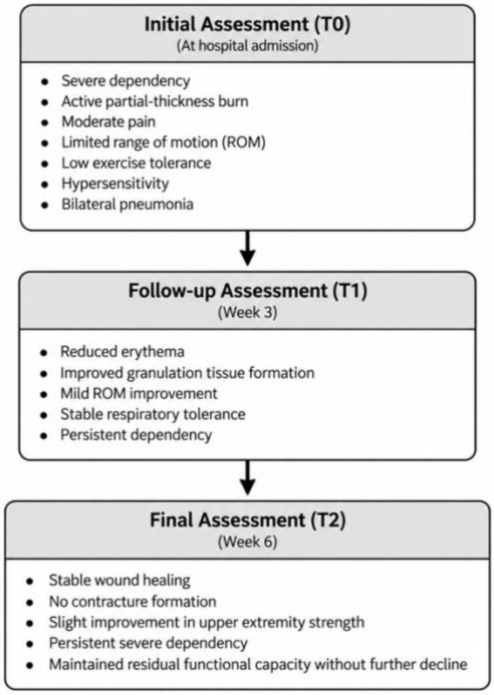

Figure 2. Clinical Progression of Physiotherapy Outcomes from Initial to Final Assessment

Discussion

This case report described physiotherapy management in an older adult with partial-thickness burn following scald injury accompanied by recurrent stroke, right hemiparesis, bilateral pneumonia, frailty features, and prolonged immobilization. The main findings demonstrated gradual wound healing progression without contracture formation, mild improvement in upper extremity ROM and muscle activation, persistent sensory hypersensitivity, and stable severe functional dependency throughout the six-week rehabilitation period. These findings highlight the complexity of burn rehabilitation in frail geriatric patients with multimorbidity, in whom rehabilitation goals may prioritize prevention of further decline rather than rapid functional restoration.

Serial wound evaluation demonstrated gradual reduction of erythema, improved wound drying, and stable granulation tissue formation from T0 to T2 without evidence of secondary infection or wound deterioration. These findings are consistent with the normal healing trajectory of partial-thickness burn, in which preserved dermal structures support spontaneous re-epithelialization and granulation tissue formation.[1,3]However, wound healing in older adults is frequently slower because aging is associated with impaired collagen remodeling, reduced inflammatory regulation, sarcopenia, vascular changes, and decreased physiological reserve.[4] In the present case, recurrent stroke, prolonged immobilization, and bilateral pneumonia may also have contributed to delayed tissue recovery through reduced mobility and systemic deconditioning. Although complete wound closure was not achieved during hospitalization, the absence of wound worsening or contracture formation suggested that the rehabilitation program was clinically tolerated and beneficial.

An important finding in this case was the absence of fixed contracture throughout the rehabilitation period despite prolonged bed rest and persistent flexion positioning tendency at the elbow and wrist. Burn contracture is commonly associated with prolonged immobilization, pain avoidance behavior, edema, and soft tissue shortening, particularly when burns involve periarticular regions.[2] Therefore, anti-contracture positioning, ROM exercise, pressure relief, and gentle stretching were prioritized early during rehabilitation. In this medically complex patient, prevention-focused intervention appeared more realistic than aggressive mobility restoration because advanced age, frailty, neurological deficits, and limited cardiopulmonary tolerance substantially restricted rehabilitation progression.

Serial ROM evaluation demonstrated only mild improvement in elbow and wrist mobility over six weeks. The relatively small ROM progression may be explained by several interacting factors, including pain-related movement restriction, persistent tissue hypersensitivity, prolonged immobilization, recurrent stroke-related weakness, and low exercise tolerance. Stroke-related hemiparesis likely reduced motor control, postural stability, and active participation during rehabilitation sessions. In addition, frailty-associated sarcopenia and deconditioning may have reduced adaptive capacity during exercise progression.[4]These findings support previous reports indicating that rehabilitation outcomes in older adults with multimorbidity are often slower and less pronounced compared with younger burn populations.[5]

Muscle strength evaluation demonstrated slight improvement in proximal upper extremity activation at T2, although substantial weakness persisted throughout rehabilitation. Reduced muscle performance in this patient was likely multifactorial and influenced not only by burn-related pain and immobilization, but also by pre-existing neurological impairment, pneumonia-related fatigue, prolonged hospitalization, and age-related muscle loss. Previous studies have shown that prolonged immobilization in patients with burn injury may accelerate skeletal muscle atrophy, respiratory muscle weakness, and generalized deconditioning.[6]Consequently, physiotherapy goals in medically complex geriatric patients may focus primarily on preserving residual muscle activation and minimizing further deterioration rather than achieving rapid strength recovery within a short inpatient period.

An important finding in this case was the absence of improvement in Barthel Index score throughout serial evaluation. At first glance, stable functional scores may appear to indicate limited rehabilitation effectiveness. However, interpretation of functional outcomes in frail geriatric patients requires contextual clinical analysis. Functional dependency in this patient was influenced by recurrent stroke with hemiparesis, severe deconditioning, prolonged bed rest, bilateral pneumonia, low endurance, pain, and reduced physiological reserve associated with frailty. Therefore, maintenance of functional stability during prolonged hospitalization may itself represent a clinically meaningful rehabilitation outcome. This interpretation supports the concept of prevention-focused rehabilitation, in which prevention of further decline becomes a realistic therapeutic goal in medically complex older adults.[15]

The persistent severe dependency observed in this case also highlights the limitation of the Barthel Index when used as the sole functional outcome measure in highly complex geriatric populations. Although the Barthel Index is practical and validated in stroke rehabilitation. it may not be sufficiently sensitive to detect subtle improvements in movement quality, caregiver burden reduction, positioning tolerance, respiratory endurance, or prevention of secondary complications. Consequently, maintenance of stable Barthel Index scores should not automatically be interpreted as rehabilitation failure in patients with severe multimorbidity.

Sensory examination demonstrated persistent hypersensitivity from T0 to T2 without progression toward sensory normalization. This finding is consistent with partial-thickness burn physiology, in which superficial dermal nerve endings remain partially intact and become excessively stimulated during wound healing.[1] Persistent hypersensitivity may also limit movement confidence and tolerance during exercise. Furthermore, sensory recovery in burn injury may require longer observation periods because neural adaptation and tissue remodeling continue throughout scar maturation phases.[16] The stable sensory findings observed in this case therefore likely reflected ongoing tissue healing rather than neurological deterioration.

Respiratory limitation also substantially influenced rehabilitation progression in this patient. Bilateral pneumonia combined with prolonged bed rest contributed to reduced endurance, rapid fatigue, shallow breathing pattern, and limited tolerance for transfer and mobilization activities. Previous literature has shown that prolonged immobilization may worsen pulmonary ventilation, respiratory muscle performance, and secretion clearance in hospitalized patients.[6],[7] Therefore, breathing exercise, positioning optimization, and gradual mobilization were integrated into physiotherapy management to minimize pulmonary complications and support functional tolerance. Although objective respiratory outcomes were unavailable, clinically the patient demonstrated improved breathing comfort and reduced fatigue during assisted positioning at later evaluations.

Family involvement represented another important component of rehabilitation in this case. Because the patient demonstrated severe dependency and limited communication ability, caregiver-assisted positioning, ROM exercise, pressure relief, and mobility support became essential parts of daily rehabilitation. Family-centered rehabilitation is particularly important in frail older adults because caregivers frequently continue exercise supervision and mobility assistance after discharge.[9]The progressive ability of caregivers to assist repositioning and simple exercises independently may therefore represent an additional practical rehabilitation outcome not fully reflected by standardized functional scales.

Several limitations should be acknowledged in this report. First, this study represented a single case report without control comparison, thereby limiting generalizability. Second, several outcomes remained primarily descriptive because objective respiratory measurements, scar assessment, frailty screening, and quality-of-life evaluation were unavailable during routine clinical practice. Third, no long-term follow-up after discharge was performed, making it difficult to evaluate long-term functional progression and scar maturation. Finally, natural healing processes of partial-thickness burn may also have contributed to wound improvement independently of physiotherapy intervention.

Despite these limitations, this case highlights the importance of individualized, prevention-focused, and family-assisted physiotherapy rehabilitation in frail older adults with burn injury and multimorbidity. In medically complex geriatric patients, rehabilitation success should not be interpreted solely through rapid functional improvement but also through preservation of residual capacity, prevention of secondary complications, and maintenance of clinical stability during prolonged hospitalization.

Conclusion

This case report described physiotherapy management in an older adult with partial-thickness burn following scald injury accompanied by recurrent stroke, bilateral pneumonia, and severe functional dependency. Serial evaluation demonstrated gradual wound healing progression without contracture formation, mild improvement in upper extremity ROM and muscle activation, persistent hypersensitivity, and stable functional dependency throughout the six-week rehabilitation period.

These findings suggest that physiotherapy rehabilitation in frail older adults with burn injury and multimorbidity should prioritize prevention-focused rehabilitation, including maintenance of residual function, prevention of contracture and pressure injury, minimization of immobilization-related complications, and optimization of caregiver-assisted mobility. In medically complex geriatric patients, maintenance of functional stability during prolonged hospitalization may represent a clinically meaningful rehabilitation outcome.

This report highlights the importance of individualized bedside rehabilitation integrating positioning, ROM exercise, respiratory intervention, gradual mobilization, and family-centered care. Active caregiver involvement appears essential to support continuity of rehabilitation and long-term functional management after discharge.

Future studies with longitudinal follow-up, objective respiratory assessment, scar evaluation, frailty screening, and quality-of-life outcomes are recommended to strengthen evidence regarding physiotherapy management in geriatric burn rehabilitation.

Limitations

This report has several limitations. First, this study represented a single case report without comparison groups, thereby limiting generalizability. Second, several outcomes, including respiratory capacity, scar maturation, frailty status, and quality of life, were not evaluated using standardized objective instruments. Third, no long-term follow-up after hospital discharge was conducted. Finally, some wound improvement may also have been influenced by the natural healing process of partial-thickness burn in addition to physiotherapy intervention.

Clinical Implications

Physiotherapists managing frail older adults with burn injury and multimorbidity should consider realistic rehabilitation goals focused on prevention of further decline rather than rapid functional restoration. Early positioning, pressure relief, ROM exercise, respiratory management, and caregiver-assisted rehabilitation may help maintain clinical stability and reduce immobilization-related complications during prolonged hospitalization.

Patient And Family Perspective

The patient's family reported that the rehabilitation program helped improve confidence in assisting repositioning, simple exercise, and daily care activities during hospitalization. Family members also reported that caregiver education was beneficial in supporting continuation of mobility assistance and prevention of prolonged immobilization after discharge.

Author Contribution

Nimas Ayu Anggraeni: Patient assessment, Intervention, Data curation, Investigation, Literature review, Writing original draft.
Wahyu Tri Sudaryanto: Supervision, Methodology, Interpretation of rehabilitation findings, Writing review and editing.
Galih Adhi Isak Setiawan: Patient management, Data curation, Clinical documentation, Data analysis, Writing review and editing.
All authors: Final approval of the manuscript and accountability for all aspects of the work.

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Conflict of Interest Statement

The authors declare that there are no conflicts of interest related to this study or publication of this manuscript.

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Ethics Statement

Written informed consent was obtained from the patient's family for anonymous publication of this case report and accompanying clinical information. All identifiable patient information was anonymized to maintain confidentiality according to ethical standards for case reporting.

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