Review

Continuity of Care After Skin Grafting in Burn Patients: Gaps in Postoperative Follow-up. A Scoping Review

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Continuity of Care After Skin Grafting in Burn Patients: Gaps in Postoperative Follow-up. A Scoping Review

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Highlights

What are the main findings?

- Structured postoperative follow-up, early rehabilitation, and telemedicine improve functional recovery, psychosocial outcomes, and access to care in burn patients undergoing skin grafting.
- Fragmented care, socioeconomic inequities, and limited rehabilitation access—particularly in low- and middle-income countries and vulnerable populations—are associated with chronic pain, disability, contractures, and poorer long-term outcomes.

What are the implications of the main findings?

- Burn aftercare should be implemented as a longitudinal, multidisciplinary, and patient-centered model that integrates rehabilitation, psychosocial support, telemedicine, and coordinated hospital-to-community transitions.
- Future research and public health policies should prioritize standardized follow-up protocols, culturally adapted interventions, and equitable access to rehabilitation services to reduce preventable disability and improve quality of life after burn injury.

Abstract

(1)Background: Burn injuries lead to long-term physical, psychological, and functional sequelae, with socioeconomic, clinical, and health system factors contributing to inequities in outcomes. Chronic neuropathic pain, fragmented care, and limited access to rehabilitation remain persistent challenges, particularly among vulnerable populations. (2) Methods: A scoping review was conducted following PRISMA-ScR guidelines, searching PubMed, Scopus, Web of Science, and ScienceDirect for studies published between 2010 and 2026 in English, Spanish, or Portuguese. Thirty-one studies were included, encompassing quantitative, qualitative, mixed-methods research, literature reviews, guidelines, and reports addressing continuity of care and follow-up after skin grafting in burn patients of any cause or age. Data were extracted independently and synthesized using descriptive and narrative approaches. (3) Results: The incidence of chronic neuropathic pain was 6%, often refractory and associated with smoking and substance use, with gabapentin and ascorbic acid showing significant pain reduction. Structured follow-up programs improved quality of life and psychosocial outcomes but did not reduce readmissions. Indigenous populations experienced greater severity and complications, while approximately half of patients were at risk of post-traumatic stress disorder linked to body image dissatisfaction. Telemedicine reduced access barriers, yet delays in specialized care contributed to contractures and pathological scarring. Early rehabilitation mitigated functional disability, though gaps persist in pain management, psychosocial support, and continuity of care. (4) Conclusions: Post-burn recovery is a multidimensional process requiring structured follow-up, early rehabilitation, telemedicine, and culturally adapted interventions to promote equity and patient-centered outcomes.

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1. Introduction

Burn injuries remain a major global health challenge, not only because of their acute impact but also due to the long-term physical, psychological, and social sequelae that persist for years [1]. Skin grafting is a cornerstone of reconstructive treatment, providing wound coverage and functional restoration; however, its success depends heavily on the quality of postoperative care and longitudinal follow-up [2]. Evidence shows that early mobilization after hand grafting or ambulation following lower-extremity grafting can improve functional outcomes when integrated into structured care pathways [3]. Despite advances in surgical techniques, post-burn sequelae such as contractures, stiffness, and functional limitations remain prevalent, significantly affecting quality of life [4–6]. While numerous studies have compared grafts, flaps, and dermal substitutes, most focus on immediate surgical outcomes, leaving postoperative continuity of care underexplored [7,8]. This gap is particularly relevant given persistent symptoms such as pruritus, which require ongoing management and have a substantial psychosocial impact [9]. Moreover, disparities in access to rehabilitation and specialized follow-up exacerbate inequities, especially in resource-limited settings [10]. Emerging predictive tools, including artificial intelligence models, aim to identify patients at risk of complications, yet their effectiveness depends on coordinated and equitable care systems [5]. Controversy persists regarding the extent to which structured follow-up programs improve long-term outcomes, highlighting diverging perspectives in the field. Therefore, this scoping review aims to synthesize evidence on continuity of care and postoperative follow-up after skin grafting in burn patients, emphasizing gaps and inequities that shape clinical and functional recovery, and concluding that integrated, equitable strategies are essential to improve patient-centered outcomes.

2. Materials and Methods

A scoping review was conducted following the methodological framework of the PRISMA-ScR guidelines, ensuring a systematic approach to the identification, selection, and synthesis of available evidence. The protocol for this scoping review was registered in the Open Science Framework (OSF) registry (Registration ID: Fm9py; available at: https://osf.io/fm9py). Registration was performed to ensure transparency and reproducibility of the review process, in accordance with current recommendations for scoping reviews.

2.1. Search Strategy

The literature search was performed in February 2026 across PubMed, Scopus, Web of Science, and ScienceDirect. Search strategies combined controlled vocabulary (MeSH terms) and free-text keywords related to burns, skin grafting, and continuity of care, adapted to each database with Boolean operators (AND, OR) applied to title, abstract, and keyword fields. Filters were set for language (English, Spanish, Portuguese), publication period (2010–2026), and human population. Detailed search strategies for each database are presented in Table 1.

Table 1. Database-specific search strategies.

Database	Search strategies
PubMed	(burn* OR "burn injury" OR "thermal injury" OR scald* OR "chemical burn" *OR "burn patient*") AND ("skin graft" *OR graft* OR "split thickness graft" *OR "full thickness graft*") AND (postoperative OR "post-operative" OR "after surgery" OR postsurgical) AND (follow-up OR "continuity of care" OR "continuum of care" OR outpatient OR discharge OR rehabilitation)

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Scopus	(TITLE-ABS-KEY (burn* OR "thermal injury" OR scald OR "chemical burn" OR "burn wound")) *AND (TITLE-ABS-KEY ("skin graft"* OR graft* OR "injert")) *AND (TITLE-ABS-KEY ("continuity of care" OR "continuity of treatment" OR "care continuity" OR "follow up")) AND (TITLE-ABS-KEY (postoperative OR "post-operative care" OR "after surgery")) AND (TITLE-ABS-KEY (quality OR gap* OR barrier* OR disparity* OR inequity* OR challenge* OR obstacle*))
Web of Science	TS=(burn* OR "burn injury" OR "burn patient") *AND TS=(graft*) AND TS=(postoperative OR follow-up)
ScienceDirect	("burn injury" OR "burn patient") AND ("skin graft") AND ("continuity of care" OR "care transition" OR "post-discharge care" OR "follow-up care")

2.2. Study Selection

The search yielded 1,504 records; after duplicate removal, 1,257 unique records were screened. Title and abstract screening excluded 1,121 studies, leaving 136 for full-text review. Of these, 31 met inclusion criteria and were included in the synthesis. Records were exported to Rayyan for duplicate removal. Screening was conducted in two stages: (1) title and abstract screening and (2) full-text review. Three independent reviewers performed the process, calibrated through pilot screening, with discrepancies resolved by consensus. The selection process is illustrated in a PRISMA-ScR flow diagram (Figure 1).

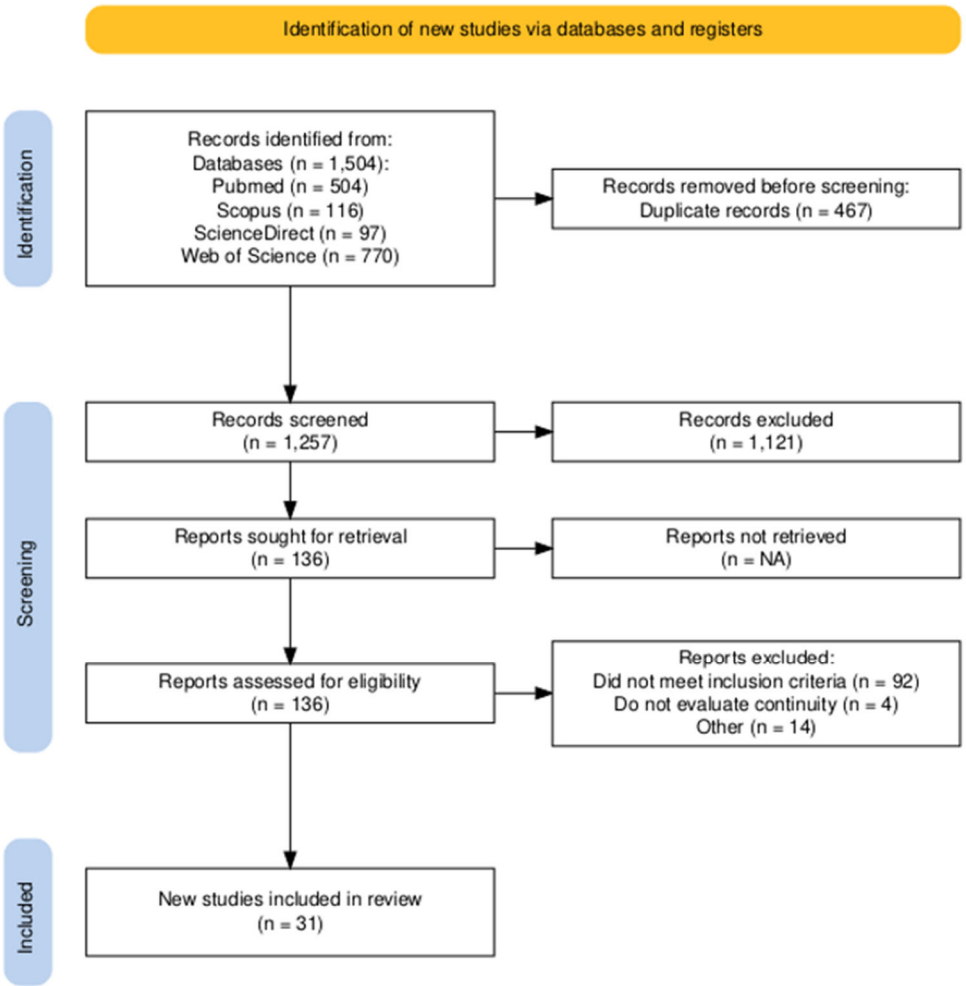

Figure 1. PRISMA 2020 flow diagram of the study identification, screening, eligibility, and inclusion process. Developed based on the official PRISMA template.

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2.3. Inclusion Criteria

Eligible studies involved burn patients undergoing skin grafting, regardless of etiology, age group, care level, or geographic setting. Study designs included quantitative, qualitative, mixed-methods research, literature reviews, clinical guidelines, consensus statements, and institutional reports published in English, Spanish, or Portuguese. Detailed inclusion criteria are presented in Table 2.

Table 2. Inclusion and exclusion criteria.

Categories	Criteria
Inclusion criteria	• Studies including burn patients of any etiology (thermal, electrical, chemical, scald). • Patients of any age group (pediatric and adult). • Studies conducted at any level of care (hospital, outpatient, or community) and in any country or health system. • Quantitative studies (clinical trials, observational), qualitative studies, mixed-methods studies, literature reviews (systematic, narrative, scoping), clinical guidelines, consensus statements, and institutional reports. • Publications in English, Spanish, or Portuguese, published between 2010 and 2026.
Exclusion criteria	• Studies on non-burn-related wounds without specific analysis of burn patients. • Studies focused exclusively on intraoperative surgical management without postoperative follow-up. • Letters to the editor, editorials, commentaries, or opinion pieces without empirical data. • Conference abstracts without full-text availability.

2.4. Exclusion Criteria

Studies were excluded if they focused on non-burn wounds, addressed exclusively intraoperative management without postoperative follow-up, or lacked empirical data (e.g., editorials, commentaries, opinion pieces). Conference abstracts without full-text availability were also excluded. Detailed exclusion criteria are presented in Table 2.

2.5. Data Extraction and Analysis

A standardized spreadsheet in Microsoft Excel was used to collect bibliographic details, study design, population characteristics, healthcare setting, and inclusion/exclusion criteria. Data were extracted on postoperative follow-up components (rehabilitation, education, telemedicine, continuity of care) and outcomes such as graft evolution, complications, functional recovery, quality of life, adherence, barriers, facilitators, inequities, and authors' recommendations. Data were synthesized descriptively and narratively to map evidence and identify gaps.

2.6. Data Availability and Ethical Considerations

All materials, extracted datasets, and protocols are available upon reasonable request, with no restrictions on data availability. This study did not involve direct intervention in humans or animals; therefore, ethical approval was not required. Generative artificial intelligence was used only for language editing and formatting of the manuscript, not for study design, data collection, or analysis.

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3. Results

3.1. Evidence Characteristics

The included studies showed substantial heterogeneity in design and scope, incorporating observational studies, qualitative research, and evidence syntheses [14,18,27]. Study designs ranged from retrospective cohort analyses and registry-based studies to mixed-methods approaches and multinational systematic reviews, reflecting the multidimensional nature of continuity of care in burn survivors. Sample sizes varied considerably, from single-center studies with limited follow-up periods to large national database analyses, which introduces important variability in the generalizability of findings.

A disproportionate representation of high-income settings was observed, while low- and middle-income countries (LMICs) remained underrepresented despite bearing a higher burden of burn-related morbidity [16,23]. Most evidence originated from North America, Europe, and Australia, with only a minority of studies conducted in African or Asian contexts. This geographic imbalance suggests that current evidence may inadequately capture context-specific barriers affecting continuity of care, including infrastructural limitations, resource constraints, and culturally determined health-seeking behaviors. Furthermore, the predominance of retrospective designs across the included literature limits causal inference and restricts the ability to assess the longitudinal impact of specific follow-up interventions on patient outcomes. The characteristics of included studies and their key findings are summarized in Table 3.

Table 3. Characteristics of included studies and key findings.

Authors and Year	Country / Setting	Study Design	Domain of Care (Continuity)	Key Relevant Findings	Reference
Klifto et al., 2021	United States	Retrospective cohort	Pain management and postoperative follow-up	Incidence of chronic neuropathic pain was 6%, associated with behavioral factors such as smoking.	Klifto et al., 2021
Ahmadi et al., 2024	Iran	Mixed-methods	Family education and home continuity of care	Family education program increased patient satisfaction, with no impact on readmissions.	Ahmadi et al., 2024
Dahl et al., 2016	Sweden	Longitudinal observational study	Mental health and psychosocial rehabilitation	50% of patients at risk of PTSD at 3 months; body dissatisfaction was a key predictor.	Dahl et al., 2016
Meng et al., 2020	LMICs (multinational)	Systematic review	Access to reconstructive surgery	Delays of up to 17 years in reconstruction, associated with permanent functional disability.	Meng et al., 2020
Parry & Bell, 2024	Multinational (20 countries)	Cross-sectional observational	Rehabilitation and post-discharge services	Reliable access to rehabilitation reduced probability of disability at discharge by 89%.	Parry & Bell, 2024
Braunstein et al., 2024	United States	Retrospective (national database)	Care fragmentation and readmissions	Care fragmentation occurred in 48.4% of readmissions, higher among low-income patients.	Braunstein et al., 2024
Martinez et al., 2018	South Africa	Retrospective observational	Telemedicine and remote triage	WhatsApp use reduced unnecessary hospitalizations and optimized triage in resource-limited settings.	Martinez et al., 2018

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Chua et al., 2026	Australia and New Zealand	Registry-based retrospective study	Continuity of care and hospital discharge	Discharge against medical advice linked to increased risk of infections and ICU readmissions.	Chua et al., 2026

3.2. Conceptualization and Components of Continuity of Care

Continuity of care was rarely explicitly defined across the included literature, and when addressed, it was operationalized through isolated components rather than integrated pathways [27]. The absence of a unified conceptual framework was a consistent limitation, as most studies focused on specific domains such as rehabilitation, outpatient follow-up, or symptom control, without conceptualizing continuity as a longitudinal and coordinated process spanning acute hospitalization, surgical recovery, and community reintegration [14,26].

Despite this fragmentation, several core components of post-burn continuity of care could be identified across studies:

- Early mobilization and physical rehabilitation [24], recognized as essential to prevent contractures and preserve functional range of motion following grafting procedures;
- Structured outpatient follow-up [25], including scheduled wound assessments, scar management, and monitoring of graft integration;
- Patient and caregiver engagement [18], encompassing education on wound care, compression garment use, and recognition of complications;
- Incorporation of telemedicine tools [21,22], which emerged as increasingly relevant particularly in geographically dispersed or resource-limited populations.

These elements were inconsistently implemented across settings and rarely standardized within formal care protocols, highlighting the absence of unified care models for post-burn follow-up [27]. The lack of standardization not only limits reproducibility across health systems but also restricts quality improvement efforts and comparative research. In contexts where multidisciplinary teams were available, integration across surgical, rehabilitation, psychological, and social care domains was described as beneficial, though formal evaluation of such models remained scarce.

3.3. Clinical and Functional Outcomes

Continuity of care emerged as a critical yet indirectly assessed determinant of long-term outcomes across the included studies. Inadequate follow-up was consistently associated with poorer recovery trajectories, with several outcome domains particularly affected.

Regarding pain and symptom burden, persistent symptoms such as chronic neuropathic pain and pruritus were highly prevalent and significantly impacted morbidity [11,12]. Klifto et al. reported a 6% incidence of chronic neuropathic pain following burn injury, associated with modifiable behavioral factors including smoking, underscoring the importance of sustained clinical follow-up to identify and address risk factors early in the recovery period. Pruritus, a near-universal complaint in burn survivors with healed or grafted wounds, was similarly associated with impaired sleep, reduced functional capacity, and diminished quality of life when not systematically managed within structured aftercare protocols.

Regarding psychological and psychosocial outcomes, sequelae including post-traumatic stress and dissatisfaction with physical appearance persisted without adequate longitudinal support [13]. Dahl et al. found that approximately 50% of patients were at risk of PTSD at three months post-injury, with body image dissatisfaction identified as a key independent predictor. These findings highlight that psychological recovery does not parallel physical healing and requires dedicated, long-term mental health integration within burn aftercare pathways.

Regarding functional recovery and rehabilitation, insufficient follow-up contributed to contractures and disability, particularly in LMICs with limited rehabilitation access [16]. Meng et al. documented reconstruction delays of up to 17 years in low-resource settings, with direct associations

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with permanent functional disability. In contrast, Parry & Bell demonstrated that reliable access to rehabilitation services reduced the probability of disability at discharge by 89% across a multinational cohort, underscoring the transformative potential of structured rehabilitation when consistently delivered.

Finally, surgical and wound-related complications, including graft loss potentially linked to wound colonization, underscored the need for close postoperative monitoring [28]. Early detection of infection, graft failure, and wound breakdown is contingent on consistent follow-up contact, reinforcing continuity of care as a patient safety imperative in the postoperative period.

3.4. Barriers, Facilitators, and Health Inequities

Social and structural determinants strongly influenced continuity of care across all settings studied. A range of barriers was identified at the individual, systemic, and structural levels:

1. Insurance status affecting access to outpatient follow-up [15], with uninsured or underinsured patients demonstrably less likely to complete recommended post-discharge care;
2. Health system fragmentation leading to readmissions in non-specialized centers [19], which disrupts the continuity of expert burn care and increases exposure to complications;
3. Discharge against medical advice, associated with poorer outcomes [20], including higher rates of infection and unplanned ICU readmission as reported by Chua et al.

Additional barriers identified in specific study populations included geographic distance from specialized burn centers, language barriers, low health literacy, and the absence of culturally adapted communication strategies. These factors compound one another, particularly in marginalized communities, and their cumulative effect on follow-up adherence remains insufficiently quantified in current literature.

Facilitators of continuity included:

- Structured outreach programs [25], which proactively engaged patients after discharge and reduced loss to follow-up;
- Multidisciplinary team approaches, integrating surgical, rehabilitation, psychological, and social care expertise;
- Family and caregiver involvement [18], which was associated with improved patient satisfaction and enhanced adherence to home care routines, as demonstrated by Ahmadi et al. in an Iranian mixed-methods study.

Health inequities were a prominent and cross-cutting theme. Disparities were most pronounced in vulnerable populations: Indigenous communities faced systemic barriers to culturally appropriate care [17], with documented higher rates of complications, longer hospital stays, and communication failures during follow-up encounters. LMICs experienced delayed rehabilitation and worse functional outcomes at a structural level [16,23], reflecting not only resource limitations but also the absence of organized, nationally coordinated burn care systems. Braunstein et al. further demonstrated that care fragmentation (occurring in 48.4% of readmissions in a US national database) was significantly more frequent among low-income patients, reinforcing that socioeconomic vulnerability amplifies the risk of discontinuous care. The identified barriers and gaps in continuity of care are shown in Table 4.

Table 4. Gaps in continuity of care and identified barriers.

Gap Category	Domain of Continuity of Care	Description of Findings and Identified Barriers	Evidence / Citations
Clinical and management gaps	Pain management and clinical follow-up	Persistence of chronic pain and pruritus up to 6 months, with significant functional impact; absence of standardized “aftercare” protocols.	Klifto et al., Dahl et al.

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Psychosocial gaps	Mental health and post-injury adaptation	High risk of post-traumatic stress disorder and challenges adapting to a "new normality" associated with skin fragility, disfigurement, and body image concerns.	Dahl et al., qualitative studies
Structural and economic barriers	Access to services and rehabilitation	Health insurance and socioeconomic status determine access to rehabilitation; in LMICs, lack of infrastructure delays essential reconstructive surgeries.	Meng et al., Parry & Bell
Population inequities	Health equity and culturally safe care	Indigenous populations experience higher complication rates, longer hospital stays, and barriers to culturally safe communication during follow-up.	Studies in indigenous populations
System fragmentation	Care coordination and transition	High proportion of readmissions to hospitals different from the index center, disrupting continuity of specialized follow-up and increasing complications.	Braunstein et al.
Geographic barriers	Accessibility and follow-up adherence	Distance to specialized centers (>50 km) is a key determinant of follow-up abandonment and poor rehabilitation adherence.	Observational studies in LMICs

4. Discussion

4.1. The Imperative of Comprehensive Rehabilitation in the Face of "Precarious Survival"

The findings of this review confirm that survival after a major burn represents only the initial phase of recovery, often described by patients and families as an "embrace of survival," marked by shared trauma and adaptation strategies [29]. However, this transition is compromised by the absence of standardized physiotherapy and occupational therapy protocols, particularly in low- and middle-income countries (LMICs), where limited rehabilitation services contribute to recurrent contractures and hypertrophic scarring [30]. Previous studies highlight that lack of early intervention in childhood leads to persistent deformities and disability, with consequences for social integration, work performance, and self-esteem, positioning rehabilitation as a cornerstone of continuity of care [31].

4.2. System Fragmentation and Social Determinants of Health

Fragmentation of care emerged as a central finding, reflecting failures in coordination across levels of care and in hospital-to-community transitions [18]. Patients from low-income backgrounds are less likely to maintain continuity within referral centers, increasing risks of undetected complications. Insurance status and social determinants strongly influence discharge disposition, adherence, and rehabilitation access [15,32]. Discharge against medical advice (DAMA), associated with ethnic minorities, rural settings, and mental health disorders, further illustrates systemic failures, leading to infections, readmissions, and preventable adverse events. These findings align with prior evidence emphasizing the need for integrated transition policies and models grounded in social determinants of health.

4.3. Need for Validated Tools and Longitudinal Functional Monitoring

A major methodological gap is the absence of standardized, transculturally validated instruments for functional recovery assessment. This limits comparability and evidence-based implementation. Adaptation of tools such as the Upper Extremity Functional Index (UEFI) has shown promise in quantifying disability and therapeutic progress [33]. Previous research indicates that even small burns may result in suboptimal recovery trajectories, influenced by psychiatric comorbidities and substance use, which are predictive of persistent pain and disability [34]. Future studies should prioritize longitudinal monitoring and validation of outcome measures across diverse populations.

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4.4. Equity and Cultural Safety in Vulnerable Populations.

Critical inequities persist among indigenous populations, who experience greater injury severity, prolonged hospital stays, and barriers to culturally safe communication. The absence of indigenous health workers and cultural safety guidelines perpetuates disparities in access and adherence [17]. These findings resonate with broader global health literature advocating for culturally adapted care models aligned with equity, social justice, and universal health coverage.

4.5. Innovation and Resources in Aftercare: Toward Hybrid Follow-Up Models.

Despite technological advances, gaps remain in managing chronic pain, pruritus, thermoregulation, and psychosocial support. Family education programs improve satisfaction and well-being but show limited impact on readmissions. Telemedicine and low-cost tools such as WhatsApp have emerged as innovative strategies to reduce barriers and facilitate remote monitoring [35]. However, heterogeneity and lack of robust trials limit generalizability, underscoring the need for longitudinal evaluations of clinical impact and cost-effectiveness which is shown in Figure 2.

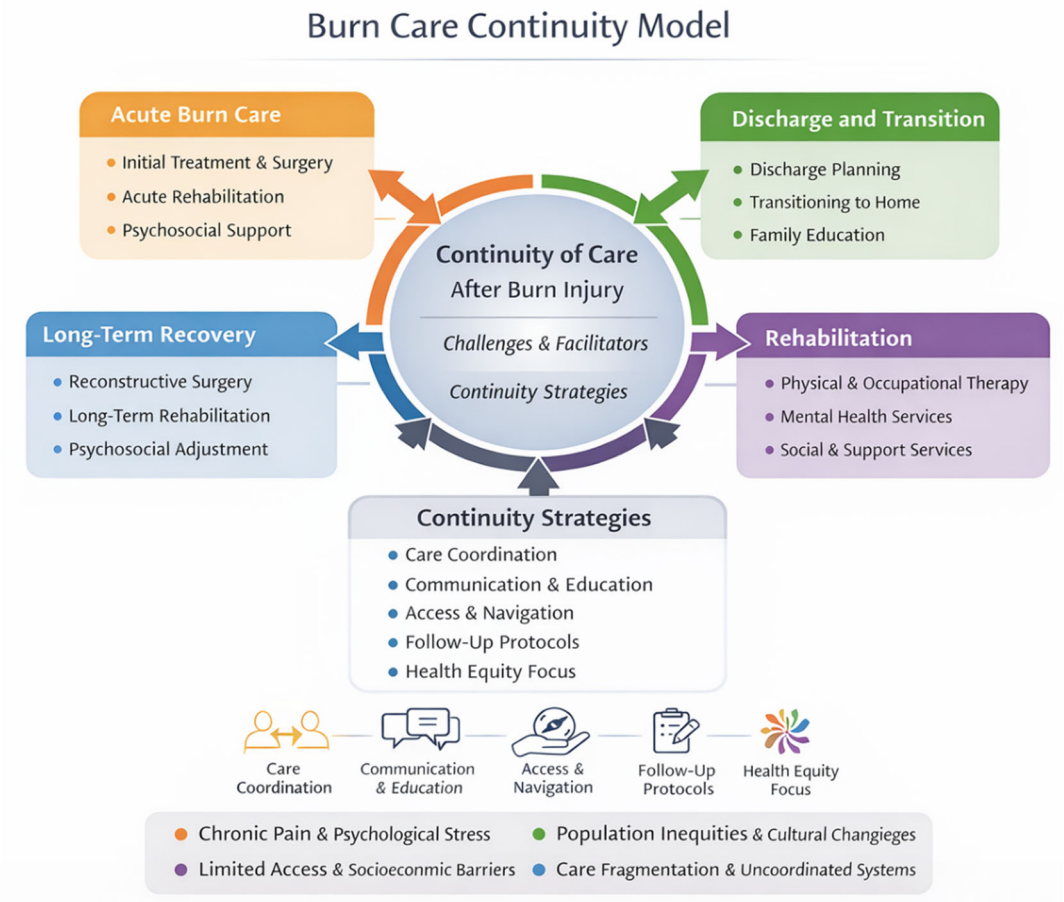

Figure 2. Post-burn Continuity of Care Model.

4.6. Implications for Clinical Practice and Public Health

Continuity of care after skin grafting should be conceptualized as a longitudinal, integrated, patient-centered process extending beyond hospital-based models [36–38]. Evidence supports early rehabilitation, structured transition strategies, telemedicine, family education, and culturally adapted approaches to reduce disability and inequities [39]. Development of a standardized core outcome set for burn survivors and public health policies strengthening community-based rehabilitation are urgently needed [40].

Continuity of care depends on coordinated hospital-to-community transitions, early rehabilitation, removal of economic barriers, incorporation of functional monitoring tools, and

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patient-centered models sensitive to sociocultural context. Without systemic strategies, survival after burn injury risks remaining a form of "precarious survival," marked by persistent disability and preventable inequities.

5. Conclusions

Continuity of postoperative care in burn patients undergoing skin grafting constitutes a complex, longitudinal, and multidimensional process, in which initial survival represents only the beginning of a prolonged trajectory of physical, functional, and psychosocial recovery. This review highlights persistent clinical gaps in the management of pain, pruritus, thermoregulation, and rehabilitation, as well as the absence of standardized "aftercare" protocols, particularly in low- and middle-income countries. These limitations contribute to adverse long-term outcomes, including contractures, pathological scarring, and functional disability.

Furthermore, continuity of care is shown to be deeply conditioned by social determinants of health and by fragmentation within healthcare systems. Factors such as socioeconomic status, type of health insurance, geographic distance, and cultural barriers play a decisive role in access to specialized follow-up and rehabilitation, exacerbating inequities in vulnerable populations, particularly among indigenous communities. Fragmented follow-up, readmissions to non-specialized centers, and discharge against medical advice reflect structural failures in discharge planning and in the transition to community-based care.

Despite these challenges, emerging models of decentralized follow-up, telemedicine, and family involvement show promising potential to improve early detection of complications and strengthen continuity of care. However, the available evidence remains heterogeneous and limited, restricting its widespread implementation. In this context, key priorities for future research include: (1) the development and evaluation of community-based and hybrid follow-up models adapted to resource-limited settings; (2) the implementation of longitudinal studies assessing functional outcomes and quality of life among burn survivors; (3) the standardization of core outcomes and validated measurement tools; and (4) the integration of culturally safe approaches grounded in social determinants of health.

Overall, these findings underscore the need to transform current care models toward integrated, patient-centered systems that account for the broader social context and ensure an effective transition from hospital to community. Only through a systemic strategy that integrates early rehabilitation, structured follow-up, and equitable access to care will it be possible to transform post-burn survival into sustainable and equitable functional recovery.

Supplementary Materials: The following supporting information can be downloaded at the website of this paper posted on Preprints.org, Table S1: checklist.

Author Contributions: Maria Alejandra Rodriguez Martinez: Conceptualization, methodology, literature search, data extraction, formal analysis, and writing of the original draft. Maria Fernanda Polo Miranda: Liter-ature search, data extraction, data analysis, and critical review of the manuscript. Maria José Rodríguez Serrano: Literature search, data extraction, and critical review of the manuscript. Erwin Hernando Hernández Rincón: Methodological supervision, formal analysis, and critical review of the manuscript. All authors have read and agreed to the published version of the manuscript.

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Abbreviations

The following abbreviations are used in this manuscript:

LMICs	Low and middle income counties
UEFI	Upper Extremity Functional Index

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