Review

Advanced Dressings for the Management of Pediatric Burns Within the First 24 Hours: A Scoping Review

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Abstract

Introduction. Pediatric burns are a frequent cause of emergency department attendance and hospitalization and may result in acute pain, infection, delayed healing, and long-term sequelae such as hypertrophic scarring and functional impairment. Early management aims to limit burn progression, optimize the wound microenvironment, and reduce the burden of painful dressing changes for children and families. First aid behaviors and the choice of first-line topical agents and dressings vary widely, and traditional treatments such as silver sulfadiazine have been challenged by newer dressings designed to improve comfort and support outpatient care.

Methods. We conducted a scoping review in accordance with PRISMA-ScR guidance to map evidence on conservative, non-surgical topical agents and dressings used as first-line treatment for minor-to-moderate pediatric burns (age <18 years). We searched PubMed/MEDLINE, Embase, CINAHL, and the Cochrane Library and screened titles/abstracts and full texts in duplicate. We included comparative and non-comparative studies reporting outcomes related to healing, infection, pain, dressing burden, resource use, and scar endpoints. Findings were synthesized descriptively without meta-analysis or risk-of-bias appraisal.

Results. From 2,397 records, 38 studies met eligibility

criteria. Designs were heterogeneous (randomized trials, prospective/retrospective cohorts, pilots, observational analyses, and case-based reports) and were conducted across multiple countries. Interventions included first aid and analgesic adjuncts; silver sulfadiazine compared with alternative topical agents and dressings; advanced silver-impregnated systems (eg, hydrofiber/foam dressings); biosynthetic or synthetic membranes and biomaterials (eg, Suprathel®, Biobrane®); hyaluronic acid–based protocols; nanocellulose dressings; gel-based or bioactive treatments; and other innovative dressings. Across comparative studies in superficial-to-partial thickness burns, several advanced dressings were associated with fewer dressing changes and lower procedural pain while achieving comparable or faster re-epithelialization than silver sulfadiazine. Effects on infection, length of stay, and scar outcomes were variable and often limited by inconsistent definitions and follow-up.

Discussion. The mapped literature indicates that selected advanced dressings may provide clinically meaningful advantages by reducing dressing-change frequency and procedural pain, potentially facilitating outpatient management in appropriate cases. However, certainty is constrained by heterogeneity in burn depth assessment, variation in debridement and analgesia pathways, and inconsistent outcome reporting, with limited long-term scar and functional data. Future studies should adopt standardized, patient-centered pediatric outcomes (healing, infection definitions, validated pain/itch measures, and scar assessments) and pragmatic comparative designs to inform internationally applicable care pathways.

Keyword: Burns, Dressings, Pediatrics, Silver Sulfadiazine, Wound Care

Introduction

Pediatric burns are a frequent cause of emergency department attendance and hospitalization worldwide and remain a substantial source of acute morbidity. Beyond the immediate risks of pain, fluid loss, and infection, children may experience delayed healing, functional impairment, psychosocial sequelae, and hypertrophic scarring, particularly after deeper partial-thickness injuries or prolonged inflammation.[1-3]

The global epidemiology of pediatric burns is heterogeneous and reflects differences in household safety, fuel sources, supervision, and access to timely care. International data highlights a disproportionate burden in low- and middle-income settings and underscore the importance of prevention strategies and standardized acute care pathways.[4-9]

Burn severity is typically determined by depth and extent. Superficial burns involve the epidermis; partial-thickness burns extend into the dermis and may be superficial or deep; full-thickness burns penetrate the entire dermis and generally require surgical management. Depth assessment guides expectations regarding spontaneous re-epithelialization, infection risk, and scarring potential (Figure 1).[2,3]

For minor-to-moderate burns managed conservatively, early interventions aim to limit burn progression, optimize the wound environment, reduce pain, and prevent infection. First aid cooling with running water is widely

promoted; however, adherence is variable, and non-recommended home remedies remain common in community practice.[10-13]

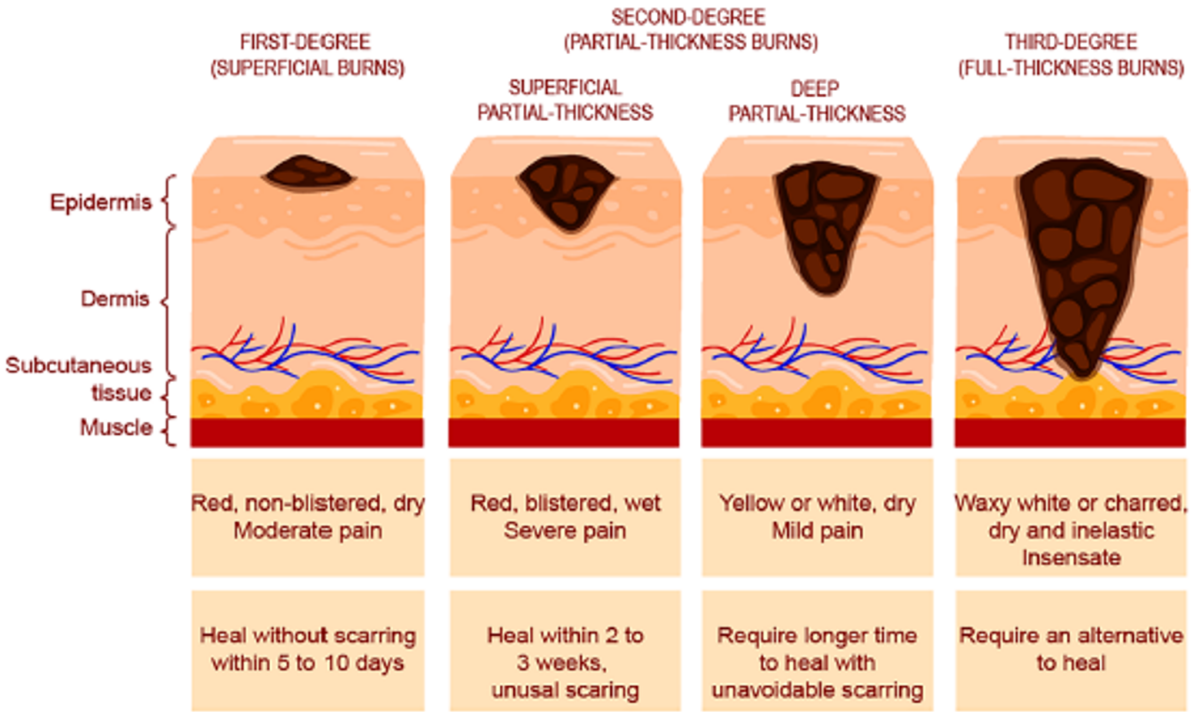

Figure 1. Classification of burns based on depth (CC BY-NC-ND 4.0).[2]

Topical therapy and dressings are central components of conservative pediatric burn care. Traditional approaches such as silver sulfadiazine (SSD) have historically been used for their antimicrobial properties, yet have been associated with frequent dressing changes and painful procedures. In recent years, advanced dressings—including silver-impregnated hydrofiber or foam systems, biosynthetic membranes, nanocellulose, and bioactive gels—have been developed to maintain a moist wound environment, reduce dressing frequency, and improve tolerability in outpatient settings.[11,14,16-20]

Despite a growing body of primary studies, the evidence base remains diverse in terms of burn depth definitions, co-interventions (e.g. debridement, analgesia protocols), and outcome reporting.

A scoping approach is therefore useful to map available interventions and outcomes, identify evidence gaps, and inform future comparative research and guideline development.

The aim of this scoping review was to map the available evidence on conservative, non-surgical topical agents and advanced dressings used as first-line treatment in pediatric minor-to-moderate burns and to summarize the outcomes reported across studies relevant to clinical decision-making and international practice.

Methods

This work was designed as a scoping review to systematically map available evidence, characterize intervention types, and summarize outcomes without restricting inclusion to a single study design. The review was conducted in accordance with PRISMA-ScR guidance.[12]

The research question was formulated

Table 1. PCC framework used to formulate research questions.

Population	Children and adolescents (<18 years) with minor–moderate, superficial or partial-thickness burns managed non-surgically
Concept	Early first-line advanced dressings and/or topical agents (ideally within 24 hours), and related outcomes (pain, dressing change burden, time to re-epithelialization/healing, infection, comfort/scarring)
Context	Acute burn care across emergency departments, burn units, inpatient and outpatient settings

using the PCC framework (Table 1), focusing on children and adolescents with minor-to-moderate burns managed conservatively and on first-line dressings or topical agents used in the initial phase of care.

Eligibility criteria were defined a priori (Table 2). We included studies enrolling patients aged <18 years with superficial or partial-thickness burns treated with conservative (non-surgical) management. Interventions of interest were topical agents and dressings used as first-line therapy in the initial management phase. We excluded studies focusing on major burns requiring early excision and grafting as a primary approach or studies where pediatric outcomes could not be separated from adult

Table 2. Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
Age <18 years	Mixed adult/pediatric populations without separable pediatric data
Superficial or partial-thickness burns managed conservatively	Major burns requiring surgical intervention (e.g. early excision/ grafting as primary approach)
Topical agents/dressings as first-line treatment	Non-conservative protocols as primary treatment
English or Italian language	No English abstract and no accessible full text

data. The search was conducted from May 2025 to June 2025 across four electronic databases: PubMed, CINAHL, Cochrane Library, and Embase. Keywords and MeSH terms related to pediatric burns, child burns, teenager burns, first dressing, first twenty-four hours, twenty-four hours dressing, advance dressing, hydrogel, cream dressing and antiseptic dressing were combined using Boolean operators AND and OR. The inclusion of the keyword 'first twenty-four hours' made it possible to include studies in which the dressing under examination is described as the initial treatment; however, in many of these studies the timing of application is not reported, making it impossible to determine with certainty whether it was performed within the first 24 hours after the burn. The search strategies are presented in Supplementary 1.

Search results were exported and de-duplicated prior to screening. Titles and abstracts were screened independently by two reviewers, followed by full-text assessment for eligibility. Disagreements were resolved by discussion and consensus.

For each included study, data were charted using a standardized extraction approach capturing study design, setting, participant characteristics, burn depth/extent, intervention and comparator details (including debridement or co-interventions where reported), and outcomes. This process was carried out using Excel software. Outcomes of interest included time to re-epithelialization, infection, pain (including procedural pain), dressing-change frequency, resource utilization (e.g. length of stay, outpatient feasibility), and scar-related endpoints (e.g. Vancouver Scar Scale [VSS] and Patient and Observer Scar Assessment Scale [POSAS]).

In line with scoping review objectives, we synthesized findings descriptively and did not perform meta-analysis. Formal risk-of-bias appraisal was not undertaken. The study selection process is summarized in the PRISMA flow diagram (Figure 2).

Results

Thirty-eight studies were included. Study designs were diverse, with a predominance of retrospective studies (n = 16), followed by prospective studies (n = 8), randomized controlled trials (n = 6), pilot studies (n = 4), observational studies (n = 2), and one case report and one case series. The primary settings were the emergency department, burn unit, and pediatric surgery department. However, many studies identified the hospital generally without specifying the exact setting or failed to report the study location entirely. The evidence was geographically broad, spanning 19 countries across multiple continents (including Bangladesh, Türkiye, Hungary, the United States, the United Kingdom, the Netherlands, Germany, Switzerland, Bahrain, New Zealand, China, United Arab Emirates, France, Australia, Thailand, Sweden, Israel, Austria, and Hong Kong). Key study characteristics are summarized in Table 3 and Supplementary 2. Statistical significance was indicated where possible. In many studies, the authors do not specify statistical significance.

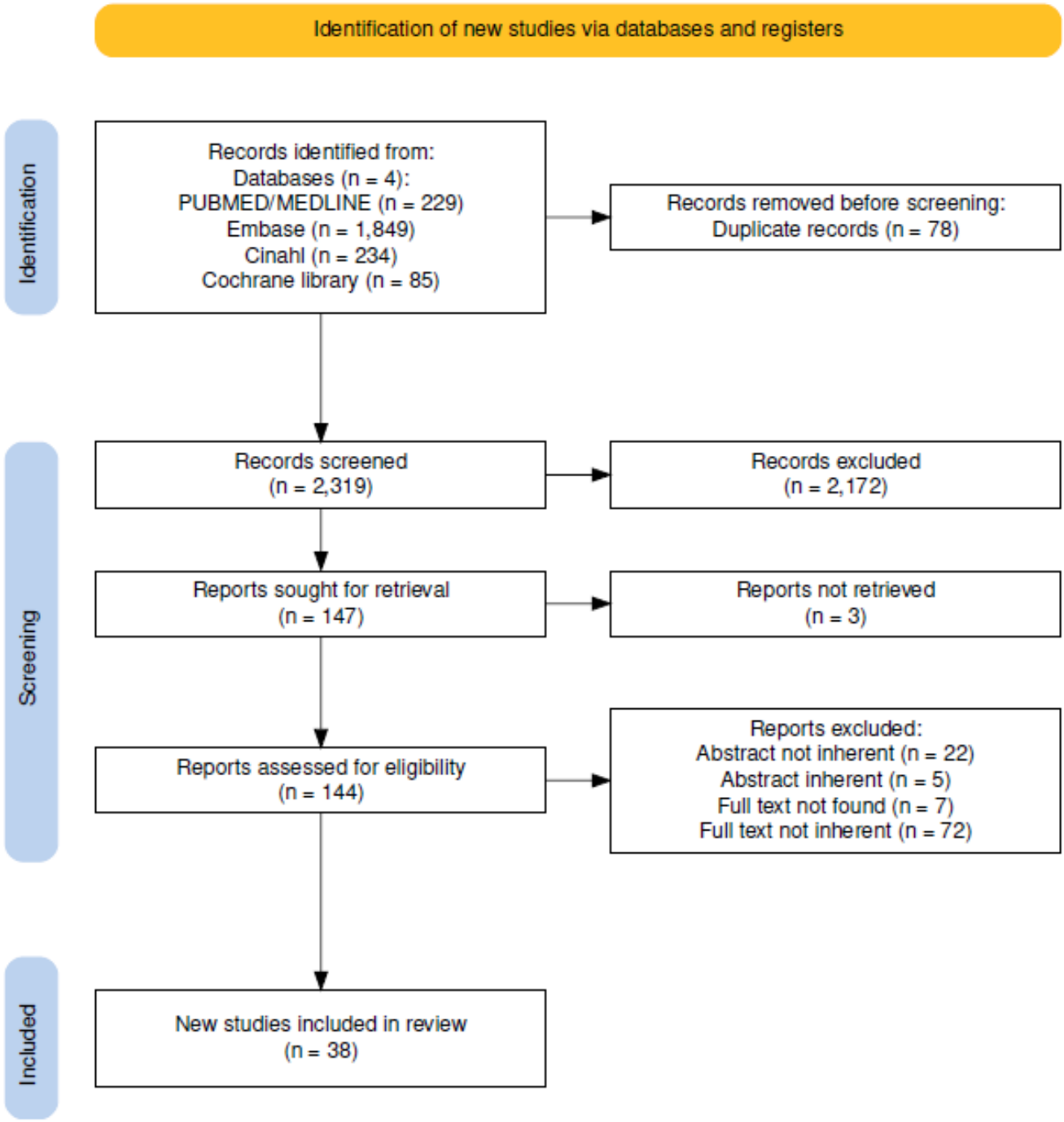

Figure 2. PRISMA flow diagram of study selection.

First aid and early analgesic adjuncts (2 studies)

In an observational comparison of first-aid practices in two cities (Cardiff and Denver), most caregivers attempted first aid, yet adherence to national recommendations was low; running-water cooling was used in 64% and 57% of cases, respectively, and a wide range of non-recommended substances (e.g. food products, toothpaste, shampoo) were reported.[13]

The role of hydrogel as an early adjunct for pain control was less clear. In a pediatric comparison, hydrogel did not differ meaningfully from a thin plasticized polyvinyl chloride layer across self-reported pain, heart rate, temperature, and stress-related measures.[14]

Silver sulfadiazine and traditional topical therapy comparisons (7 studies)

Multiple studies compared silver sulfadiazine (SSD) with alternative topical agents and

Table 3. Key study characteristics.

Country	Study count	Percentage
United States	8	21.1%
Hungary	4	10.5%
Turkey	3	7.9%
Netherlands	3	7.9%
France	3	7.9%
Germany	2	5.3%
Australia	3	7.9%
China	2	5.3%
New Zeland	2	5.3%
United Kingdom	1	2.6%
Bahrain	1	2.6%
Switzerland	1	2.6%
United Arab Emirates	1	2.6%
Israel	1	2.6%
Bangladesh	1	2.6%
Austria	1	2.6%
Sweden	1	2.6%
Thailandia	1	2.6%
Total	38	100%
Study design	**Study count**	**Percentage**
Retrospective study	10	26.3%
Prospective / observational study	7	18.4%
Randomized controlled trial	7	18.4%
Case- control	2	5.3%
Case series/ case report	2	5.3%
Pilot study	3	7.9%
Cohort study	4	10.5%
Cross-sectional study	1	2.6%
Mixed-methods study / Combined study	2	5.3%
Total	38	100%
Year	**Study count**	**Percentage**
2015	1	2.6%
2016	2	5.3%
2017	3	7.9%
2018	3	7.9%
2019	3	7.9%
2020	3	7.9%
2021	5	13.2%
2022	8	21.1%
2023	3	7.9%
2024	6	15.8%
2025	1	2.6%
Totale	38	100%
Setting	**Study count**	**Percentage**
Emergency Department	5	13.16%
Burn Center	8	21.05%
Pediatric Surgery	3	7.89%
Hospital (Unspecified ward)	8	21.05%
Undisclosed setting	14	36.84%
Total	38	100%

dressings. Honey-based treatment showed more favorable outcomes than SSD in one study, with faster re-epithelialization and reduced exudate and desquamation.[15]

Hydrogel applied after superficial debridement was also reported to improve healing compared with SSD in superficial-to-partial thickness burns.[16]

After debridement, cerium nitrate–SSD (CN-SSD) was associated with faster healing, whereas silver fiber dressings were linked to shorter hospitalization in a comparative report ($p<0.01$).[17]

Silver hydrofiber dressings were reported to accelerate healing relative to SSD ($p<0.05$) and to reduce dressing changes ($p< 0.05$) and pain.[18]

Non-adherent tribromophenate bismuth–petrolatum gauze (Xeroform®) supported effective healing and facilitated outpatient discharge in comparison with SSD,[19] and a related protocol emphasizing cleansing, early debridement, and non-adherent coverage was associated with reduced pain and discomfort in children ($p = 0.91$).[20] In both cases, no statistical significance was found between the groups regarding the rate of complications, including wound infection.

In a broader comparison of pediatric burn management strategies, biosynthetic dressings or topical antimicrobials were associated with complete healing within 14 days more frequently than SSD, suggesting that dressing choice and protocol design maybe associated with differences in reported early outcomes although causality cannot be inferred.[21]

Modern silver-based dressings (7 studies)

Several studies evaluated silver-coated or silver-impregnated systems. After debridement, a silver-coated dressing left in place for at least one week (or until spontaneous detachment) was associated with reduced opioid use ($p = 0{,}009$), fewer dressing changes ($p = 0{,}004$), and shorter hospitalization ($p = 0{,}023$).[22]

Comparisons of silver hydrofiber with daily paraffin gauze suggested that less frequent changes (every 3–4 days) were feasible with silver hydrofiber while supporting ongoing wound assessment ($p = 0{,}002$).[23]

When topical antibiotic ointment regimens were compared with Mepitel Ag®, standard ointment was associated with shorter healing time, with no clear differences in pain, infection, or grafting needs.[24]

In a randomized comparison, Mepilex Ag® was associated with faster re-epithelialization and less pain than Acticoat®, whether Acticoat® was used alone or combined with an interface layer.[25]

Acticoat® was also studied in combination with Biobrane®. A pilot report suggested that adding Biobrane® beneath Acticoat 7® may reduce healing time (p= 0.18) and grafting requirements but could increase infection risk relative to Acticoat® alone (p= 0.057).[26]

In a clinical comparison after standardized cooling, cleansing, and blister de-roofing, both Acticoat® and Aquacel Ag® supported re-epithelialization and infection prevention; however, Aquacel Ag® required fewer dressing changes and was associated with less pain related to dressing procedures (p = 0.03).[27]

A study comparing five commonly used dressings (including silver-, calcium-, and zinc-containing options) found broadly similar histologic healing parameters in non-infected burns, with no statistically significant differences across most measures.[28]

Silver dressings compared with biomaterials and synthetic membranes (6 studies)

Aquacel Ag® compared with an allogeneic fetal dermal fibroblast dressing supported by collagen (PBB) was associated with a higher need for corrective procedures or grafting, while PBB showed better outcomes for hypertrophic scarring in that comparison.[29]

Systemic biomarker effects were explored in a comparison of silver hydrofiber versus a polylactic acid–based polymer membrane (PML), with the PML group showing more rapid normalization of oxidative stress indices.[30]

Suprathel® (a bioresorbable synthetic copolymer membrane) was applied after debridement in several reports. Some protocols used topical preparation (eg, PHMB-containing gel or enzymatic systems) followed by a second debridement prior to Suprathel® placement and protective secondary layers.[31]

Time to re-epithelialization with Suprathel® ranged from approximately 9.5 days to 13 days across reports. Reported advantages incluted good adherence, reduced need for frequent dressing changes, early discharge in selected cases, and favorable scar scores at 3–6 months in one cohort. A comparative study suggested Suprathel® may be a viable alternative to Mepilex Ag® with similar outcomes.[31-34]

Hyaluronic acid–based treatments (4 studies)

Hyaluronic acid–based approaches were evaluated in several studies. A zinc–hyaluronate gel applied 3–5 times daily after cleansing, antisepsis, and debridement was associated with rapid wound closure and low complication rates, contributing to fewer hospital admissions.[35]

Two related studies combined zinc–hyaluronate gel with Aquacel Ag® foam after an initial 24-hour silver nitrate application, reporting epithelialization by day 6–7 and describing the approach as gentle and effective for whole-body burns and hand burns.[36,37]

In a separate cohort, topical hyaluronic acid was described as a safe alternative for second-degree burns, with epidermization in approximately 14 days, low grafting rates, and no infectious complications.[38]

Nanocellulose dressings (5 studies)

Nanocellulose dressings were associated with favorable clinical outcomes in pediatric cohorts. Reported mean hospital stay was approximately 6.7 days, with dressing changes under anesthesia averaging 2.4. Mean re-epithelialization occurred within about 10 days in two reports, and scar outcomes were generally within normal ranges across multiple domains; no infections or sepsis/toxic shock cases were reported.[39-41]

Epicite Hydro® (a synthetic nanocellulose dressing hydrated with isotonic saline) applied after cleansing and chlorhexidine antisepsis was associated with shorter hospital stay (about 2 days) (p< 0.001) and lower pain scores than control approaches (p<0.001). Healing trends were around day 15, and rates of healed wounds, additional treatments, and infection did not differ substantially from controls.[42,43]

Gel-based and bioactive topical treatments (3 studies)

Three studies evaluated gels with different active principles: recombinant human GM-CSF gel (rhGM-CSF), a surfactant-based gel (PMM), and keratin-based gel protocols. rhGM-CSF combined with a collagen sponge shortened healing time and reduced Vancouver Scar Scale scores compared with collagen sponge alone in head/neck burns (p< 0.05).[44]

In a case series, PMM used alone or with a topical antimicrobial promoted autolytic

debridement and shortened re-epithelialization time compared with prior local practice; the gel was applied directly and changed at intervals up to 3 days.[45]

A keratin gel–based protocol tailored secondary dressings to exudate level. Most burns healed rapidly, with only 4% requiring more than 10 days; mature scar assessments (POSAS) were generally favorable, and patients reported low itch and pain with comfortable dressing changes.[46]

Other innovative dressings (4 studies)

Emerging approaches included cultured keratinocyte cell spray (CAK), chitosan dressings containing silver, polyhexamethylene biguanide (PHMB) protocols, and a lipidocolloid herbal dressing (SI-Herb®). In a two-phase protocol combining partial debridement with hydrogels, moist wound ointment, and CAK as rescue therapy, all wounds re-epithelialized with a reported mean of 10.33 days once CAK was applied.[47]

A chitosan–silver dressing moistened with saline promoted moist wound healing with near-complete healing in a mean of 8.3 days and no infected wounds during treatment.[48]

PHMB-based management after cleansing and debridement reported a mean healing time of 8.78 days, with many cases managed in the outpatient setting and no complications.[49]

Compared with chlorhexidine acetate paraffin gauze (Bactigras®), the SI-Herb® lipidocolloid herbal dressing showed faster epithelialization (p = 0,007) with lower scores for pain, bleeding, and removal difficulty (p= 0,042, 0,009, 0,003, respectively).[50]

Discussion

This scoping review mapped a heterogeneous evidence base on first-line topical agents and dressings for minor-to-moderate pediatric burns. Across 38 studies, interventions ranged from first-aid adjuncts and traditional topical antimicrobials to a wide variety of advanced dressings and biomaterials. Consistent with scoping review methodology, findings should be interpreted as a descriptive synthesis of reported interventions and outcomes rather than evidence of comparative effectiveness. Overall, the literature describes several modern dressings as being associated with reduced dressing-change frequency and procedural pain and as supporting timely re-epithelialization in superficial-to-partial thickness burns in specific clinical contexts.

Across comparative studies, several advanced dressings (including hydrofiber and silicone systems, non-adherent impregnated gauze, and nanocellulose-based products) were reported to reduce dressing-change frequency and procedural pain compared with SSD. Some reports indicate similar or shorter healing times, suggesting the feasibility of outpatient care pathways in selected settings; however, the available evidence is heterogeneous and was not designed to determine comparative effectiveness.

Pain and dressing burden emerged as consistent clinical priorities. In pediatric care, procedural pain during dressing changes can be substantial and may drive opioid use, need for sedation/anesthesia, and family distress. Advanced dressings that adhere appropriately, manage exudate, and allow longer wear times maybe therefore offer meaningful benefits even when differences in infection rates or healing time are small.[51] However, evidence suggests that the benefit differs across studies.[18,22,25,27,39-43,46]

Comparisons against SSD were common. While SSD provides antimicrobial coverage, frequent changes and the need for repeated wound manipulation can reduce tolerability. In several comparisons, alternatives—including the use of medical-grade honey, hydrofiber systems, non-adherent impregnated gauze protocols, and selected bioactive approaches—were associated with comparable healing rates and improved patient comfort or feasibility of outpatient management.[14-16, 52]

Silver-based advanced dressings were evaluated in multiple contexts, but results were not uniform. Some trials favored specific products (e.g. Mepilex Ag® over Acticoat® in pain and re-epithelialization), whereas other studies reported similar histologic or clinical outcomes across different silver-, calcium-, and zinc-containing dressings. These differences may reflect variation in burn depth, debridement strategy, and outcome ascertainment.[25,27,28,53] However, while silver ensures high antimicrobial protection, it may exert cytotoxic effects on keratinocytes and fibroblasts, potentially delaying re-epithelialization, particularly in clean wounds.[54] Furthermore, although rare, systemic absorption can occur, especially in

extensive burns.[55] Consequently, its use must be carefully weighed and tailored to the individual infection risk and lesion characteristics.

Biomaterials and synthetic membranes (e.g. Suprathel®, Biobrane®, polymer membranes, and allogeneic/biologic constructs) were frequently discussed as strategies to provide a stable moist wound environment and to protect regenerating epithelium.[56,57] Reported healing times with Suprathel® were commonly within 2 weeks, with some reports indicating favorable scar assessments at 3–6 months. However, evidence was mainly observational, and comparators and follow-up durations varied.[26,29-34]

Topical hyaluronic acid and nanocellulose dressings represent additional approaches aimed at biocompatibility and reduced dressing trauma. Studies reported short hospitalization and acceptable pain control, with scar outcomes evaluated using VSS and POSAS in selected cohorts. Nevertheless, sample sizes were often limited and reporting was inconsistent across domains.[35-43,46]

Methodological limitations were common and reduce certainty. These included heterogeneity in burn depth classification, variable definitions of infection and healing (e.g. re-epithelialization thresholds), inconsistent pain measurement tools, and limited long-term follow-up for scar and functional outcomes. Co-interventions such as timing and extent of debridement, choice of antiseptic cleansing, and analgesia pathways were incompletely reported, complicating cross-study comparisons.

From an international perspective, feasibility and availability are critical. Many settings prioritize outpatient pathways to reduce hospital burden, but dressing selection is constrained by cost, supply, and caregiver capacity to manage home care. Additionally, prevention and first-aid education remain key public health priorities, given variable adherence to evidence-informed cooling and the persistence of harmful home remedies.[58-62]

Future research should prioritize pragmatic comparative trials and standardized pediatric outcome sets. Core outcomes should include time to complete re-epithelialization, clinically meaningful infection definitions, validated pediatric pain and itch measures, and longer-term scar outcomes using standardized scales and functional assessments. Better reporting of co-interventions would improve reproducibility and translation.

Clinical Implications

The findings of this scoping review inform several practice-oriented considerations for the initial management of minor-to-moderate pediatric burns. Because procedural pain and dressing burden are prominent drivers of resource use and family distress, dressing selection may prioritize comfort, maintenance of a moist wound environment, and minimization of dressing changes when clinically appropriate.[18,22,25,27,39-43,46,51]

First aid remains a modifiable determinant of early outcomes. Variable adherence to running-water cooling and the continued use of non-recommended substances highlight an ongoing need for public education, caregiver training, and clear discharge instructions, particularly for outpatient pathways.[58-60,63]

Across comparative studies in superficial-to-partial thickness burns, several advanced dressings (including hydrofiber systems, silicone-based foams, nanocellulose, and selected synthetic membranes) were associated with fewer dressing changes and lower pain compared with SSD while achieving comparable healing. These findings suggest that, where available, advanced dressings may be compatible with outpatient management and could contribute to reducing the need for sedation or anesthesia associated with frequent lesion manipulation, although their comparative effectiveness remains uncertain.[14,18-20,22,25,27,31-34,39-43,52]

However, no single dressing is universally optimal. Clinicians should consider burn depth and exudate level, anatomic location (e.g., hands), risk of contamination, and the feasibility of follow-up.[64,65] Cost, supply constraints, and caregiver capacity to perform home care are critical determinants of implementation, especially across diverse international contexts.[4-9,21,58-61]

For services developing protocols, standardization of co-interventions (cooling, cleansing/antisepsis, blister management, and debridement) and alignment of pain-management pathways are likely to improve outcomes and comparability. Incorporating validated pediatric pain measures and scar assessment tools into routine practice could also support quality improvement and future research.[44,46]

Consider advanced dressings that allow extended wear time to reduce procedural pain

and dressing-change burden when burn depth and exudate profile are suitable.

Ensure families receive clear guidance on evidence-informed first aid and avoid non-recommended home remedies; reinforce instructions at discharge.

Select dressings based on depth, exudate, anatomic site, infection risk, and feasibility of follow-up; incorporate local cost and supply constraints.

Use standardized outcome measures (healing, infection, pediatric pain/itch, and scar scales such as VSS/POSAS) to strengthen clinical monitoring and evidence generation.

Limitations

This review has several limitations that should be considered when interpreting the findings. First, substantial methodological heterogeneity was observed across the included studies, particularly regarding the definition and measurement of key outcomes. "Healing" or "complete re-epithelialization" was not uniformly defined, with some studies relying on clinical impression, others on absence of exudate, and many not specifying explicit operational criteria. Similarly, infection was variably defined using non-standardized clinical criteria or microbiological confirmation, increasing the risk of outcome misclassification and limiting cross-study comparability.

Pain assessment was also inconsistent, with different scales used across age groups and variable timing of measurement (baseline vs procedural pain), often without clear reporting of clinically meaningful thresholds. This heterogeneity reduces confidence in comparative interpretations.

A further important limitation concerns incomplete reporting of co-interventions. Details regarding debridement (type and timing), antiseptic protocols, blister management, analgesia pathways, and criteria for hospitalization or discharge were frequently underreported. Furthermore, many studies did not specify the clinical setting in which the interventions took place (e.g., home, emergency department, or specialized burn unit). Because these factors may significantly influence healing time, pain burden, and infection rates, their variability introduces potential confounding and performance bias, limiting attribution of outcomes to the dressing itself. Furthermore, some studies did not report statistical significance for their findings, which further limits the strength of the comparative conclusions.

In addition, most included studies were retrospective or observational, often with small sample sizes and limited long-term follow-up for scar and functional outcomes. As expected in a scoping review, no formal risk-of-bias assessment was performed, and findings were synthesized descriptively. Finally, language restrictions and the inclusion of some studies available only in abstract form may have introduced selection bias.

Overall, these limitations reduce certainty regarding comparative effectiveness and highlight the need for standardized pediatric core outcome sets and transparent reporting of co-interventions in future trials.

Conclusions

Across studies that included a comparator (most commonly SSD), multiple modern dressings and biomaterials were reported to be associated with fewer dressing changes and lower procedural pain, with healing outcomes described as comparable in several reports. However, given the heterogeneity of study designs, outcome definitions, and co-interventions, comparative effectiveness between dressings cannot be established from the current evidence base.

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