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Summary of the Best Evidence for Wound Care Management in Pediatric Burn Patients

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Abstract: *Objective*: To retrieve and extract evidence related to wound care management in pediatric burn patients, summarize the best evidence, and provide evidence-based practice for clinical nursing management in pediatric burn patients. *Methods*: Evidence-based questions were identified, and domestic and international databases, as well as wound management websites, were systematically searched for guidelines, clinical decisions, evidence summaries, systematic reviews, expert consensus, and randomized controlled trials on wound care management in pediatric burn patients. The search period spanned from the establishment of the databases to December 31, 2024. Two researchers conducted literature screening, quality evaluation, and evidence summarization. *Results*: A total of 19 articles were included, comprising 4 clinical decisions, 6 guidelines, 5 expert consensus documents, and 4 systematic reviews. This study summarized 37 pieces of best evidence from six aspects: wound assessment, wound management, wound treatment, selection of topical dressings and medications, fluid resuscitation, and identification and management of infections. *Conclusion*: This study summarizes the best evidence for wound care management in children with burns, providing evidence-based support for clinical wound care management. It is recommended that healthcare professionals apply and translate the evidence in conjunction with actual clinical circumstances to conduct effective wound care management and improve the quality of life for children with burns.

Keywords: Children; Burns; Wounds; Evidence summary; Evidence-based nursing

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1. Introduction

Burns are one of the common accidental injuries among children, with a consistently high incidence globally. In 2021, the global incidence rate of burns among children and adolescents was 1,316 cases per 100,000 people [1]. Between 2016 and 2020, 11,080 children with burns were admitted to hospitals in Mexico, with those under 5 years old accounting for 55.8% [2]. Effective wound care management by healthcare professionals

is crucial for burn wound healing, preventing infections, and reducing complications [3]. Moreover, due to physiological characteristics such as a weak skin barrier and an immature immune system in children, wound care for pediatric burn patients presents greater challenges compared to adults [4,5].

In recent years, with the advancement of burn treatment research, significant progress has been made in wound care management for pediatric burn patients. The development and application of novel dressings have shortened the recovery time for pediatric wounds, while the use of negative pressure wound therapy has reduced dressing change frequency and infection rates [6,7]. Additionally, there has been a proliferation of clinical decision-making tools, guidelines, and expert consensus related to pediatric burns [3,8,9]. This study aims to systematically search for evidence, evaluate the quality of literature, extract and grade evidence, and summarize the best evidence for wound care management in pediatric burn patients. The goal is to provide scientific and practical guidance to clinical healthcare professionals, standardize nursing practices, and improve the quality of care for pediatric burn patients.

2. Data and methods

This study has been registered at the Evidence-Based Nursing Center of Fudan University (ES20246711).

2.1. Defining the evidence-based question

The clinical question "How to conduct effective and comprehensive wound care management for pediatric burn patients" was established, utilizing the PIPOST model to structure the evidence-based inquiry. The target population (Population, P) for evidence application: pediatric burn patients under 18 years old; Intervention measures (Intervention, I): measures related to burn wound care management; Evidence implementers (Professional, P): healthcare professionals; Outcome indicators (Outcome, O): wound healing/improvement in pediatric burn patients, incidence of infection, wound healing time; Evidence application settings (Setting, S): healthcare institutions; Types of evidence (Type of evidence, T): guidelines, clinical decisions, evidence summaries, systematic reviews, expert consensus, randomized controlled trials.

2.2. Literature search strategy

Based on the "6S" pyramid model of evidence-based resources, a top-down search was conducted across various databases and platforms, including UpToDate, BMJ Best Practice, the International Guideline Collaboration Network, the National Guideline Clearinghouse (USA), the National Institute for Health and Care Excellence (UK), the Registered Nurses' Association of Ontario (Canada), the Canadian Medical Association Clinical Practice Guidelines website, Medlive, the World Health Organization website, the National Health Commission of the People's Republic of China, the European Wound Management Association, the Association for the Advancement of Wound Care (USA), the Wound, Ostomy and Continence Nurses Society (USA), the World Union of Wound Healing Societies, the Joanna Briggs Institute Evidence-Based Health Care Data Center, the Cochrane Library, CINAHL, Web of Science, PubMed, Embase, China National Knowledge Infrastructure, Wanfang Medical Network, the Chinese Biomedical Literature Database, and the VIP Database. English search terms used included "Infant Newborn/Child/Infant/Adolescent", "Burns", "Wounds and Injuries", "Nursing/Disease Management/Therapeutics/Symptom Assessment", and "Guideline/Clinical Practice Guideline/Best Practice/Clinical Decision/Expert Consensus/Evidence Summary/Systematic Review/Randomized Controlled

Trial".

The Chinese search terms include "infant/child patient/child", "burn/scald/burn", "wound/burn wound", "care/assessment/management/treatment/intervention", and "guideline/clinical decision-making/evidence summary/systematic review/expert consensus/randomized controlled trial". Taking PubMed in English databases as an example, the search formula is shown in **Figure 1**.

Taking CNKI (China National Knowledge Infrastructure) in Chinese databases as an example, the search formula is: (SU=infant + child patient + child) AND (SU=burn + scald + burn) AND (SU=wound + burn wound) AND (SU=care + assessment + management + treatment + intervention) AND (SU=guideline + clinical decision-making + evidence summary + systematic review + expert consensus + randomized controlled trial).

#1 ("Infant, Newborn"[Mesh] OR "Child"[Mesh] OR "Infant"[Mesh] OR "Adolescent"[Mesh])

#2 (Infants, Newborn[Title/Abstract] OR Newborn Infant[Title/Abstract] OR Newborn Infants[Title/Abstract] OR Neonate[Title/Abstract] OR Neonates[Title/Abstract] OR Newborns[Title/Abstract] OR Newborn[Title/Abstract] OR Infants[Title/Abstract] OR Children[Title/Abstract] OR Adolescents[Title/Abstract] OR Adolescence[Title/Abstract] OR Adolescents, Female[Title/Abstract] OR Adolescent, Female[Title/Abstract] OR Female Adolescent[Title/Abstract] OR Female Adolescents[Title/Abstract] OR Adolescents, Male[Title/Abstract] OR Adolescent, Male[Title/Abstract] OR Male Adolescent[Title/Abstract] OR Male Adolescents[Title/Abstract] OR Youth[Title/Abstract] OR Youths[Title/Abstract] OR Teens[Title/Abstract] OR Teen[Title/Abstract] OR Teenagers[Title/Abstract] OR Teenager[Title/Abstract])

#3 ("Burns"[Mesh]

#4 (Burn*[Title/Abstract] OR Smoke Inhalation Injury[Title/Abstract])

#5 ("Wounds and Injuries"[Mesh]

#6 (Wound*[Title/Abstract] OR Injuries[Title/Abstract] AND Wounds[Title/Abstract] OR Injuries, Wounds[Title/Abstract] OR Wounds[Title/Abstract] OR Injury[Title/Abstract] OR Injury[Title/Abstract] OR Wounds[Title/Abstract] OR Wounds, Injury[Title/Abstract] OR Wounds[Title/Abstract] OR Wound[Title/Abstract])

#7 ("Nursing"[Mesh] OR "Disease Management"[Mesh] OR "Therapeutics"[Mesh] OR "Symptom Assessment"[Mesh])

#8(Nursings[Title/Abstract] OR Disease Managements[Title/Abstract] OR Management, Disease[Title/Abstract] OR Managements, Disease[Title/Abstract] OR Management*[Title/Abstract] OR Therapeutic[Title/Abstract] OR Therapy[Title/Abstract] OR Therapies[Title/Abstract] OR Treatment[Title/Abstract] OR Treatments[Title/Abstract] OR Therap*[Title/Abstract] OR Assessments, Symptom[Title/Abstract] OR Assessment, Symptom[Title/Abstract] OR Symptom Assessments[Title/Abstract] OR Symptom Evaluation[Title/Abstract] OR Evaluations, Symptom[Title/Abstract] OR Evaluation, Symptom[Title/Abstract] OR Symptom Evaluations[Title/Abstract] OR Assessment*[Title/Abstract] OR Evaluation*[Title/Abstract] OR Intervention[Title/Abstract])

#9 ("Guideline"[Title/Abstract] OR "Clinical Practice Guideline"[Title/Abstract] OR "Best Practice"[Title/Abstract] OR "Clinical Decision"[Title/Abstract] OR "expert consensus"[Title/Abstract] OR "Evidence Summary"[Title/Abstract]) OR "systematic review"[Title/Abstract] OR "Randomized Controlled Trial"[Title/Abstract])

#10 #1 OR #2

#11 #3 OR #4

#12 #5 OR #6

#13 #7 OR #8

#14 #10 AND #11 AND #12 AND #13 AND #9

Figure 1. English search formula.

2.3. Inclusion and exclusion criteria for literature

Inclusion criteria are as follows:

(1) The study subjects are pediatric burn patients aged ≤ 18 years;
(2) Burn wound care management measures;
(3) Wound healing/improvement status in children with burns, incidence of infection, and wound healing time;
(4) The literature types are guidelines, clinical decision-making documents, evidence summaries, systematic reviews, expert consensuses, and randomized controlled trials.

Exclusion criteria are as follows:
(1) Literature for which the full text cannot be obtained;
(2) Duplicate publications;
(3) Literature with unavailable or incomplete data;
(4) Literature not published in Chinese or English;
(5) Literature of low quality.

2.4. Literature quality assessment and assessment process

Two researchers who had received systematic training in evidence-based courses independently evaluated the included literature in a double-blind manner, strictly adhering to the literature quality assessment criteria. In cases of conflicting assessment opinions, a third authoritative researcher would discuss and make a decision. The clinical guidelines were evaluated using the Appraisal of Guidelines for Research and Evaluation II (AGREE II) [10]. For primary studies, systematic reviews, evidence summaries, and expert consensus, the corresponding assessment criteria (2016 version) from the Joanna Briggs Institute (JBI) Evidence-Based Health Care Center in Australia were used to evaluate the literature quality [11].

2.5. Evidence extraction and grading

In this study, two researchers first independently summarized the relevant information from the included literature using a self-made evidence information extraction form. The information included intervention content, outcome indicators, source literature, time, etc. After completing the extraction, they conducted a cross-check. When integrating the evidence, consistent evidence was first combined. For contradictory evidence, priority was given to authoritative literature that was of a high level, high quality, and newly published [12]. For evidence extracted from guidelines and systematic reviews, the original research literature was traced back, and the evidence was graded from level 1 to level 5 using the JBI Evidence Pre-grading System (2014 version) [13]. Finally, the extracted information was summarized as the best evidence.

3. Results

3.1. Literature screening

A preliminary search yielded 1,860 articles, with 21 remaining after initial screening. The literature screening process is illustrated in **Figure 2**. Upon evaluating the quality of the literature, two systematic reviews were deemed to be of low quality and were excluded [14,15]. The literature screening process is depicted. Ultimately, 19 articles were included, encompassing 4 clinical decisions, 6 guidelines, 5 expert consensuses, and 4 systematic reviews [3,8,9,16–32]. The basic characteristics of the included literature are presented in **Table 1**.

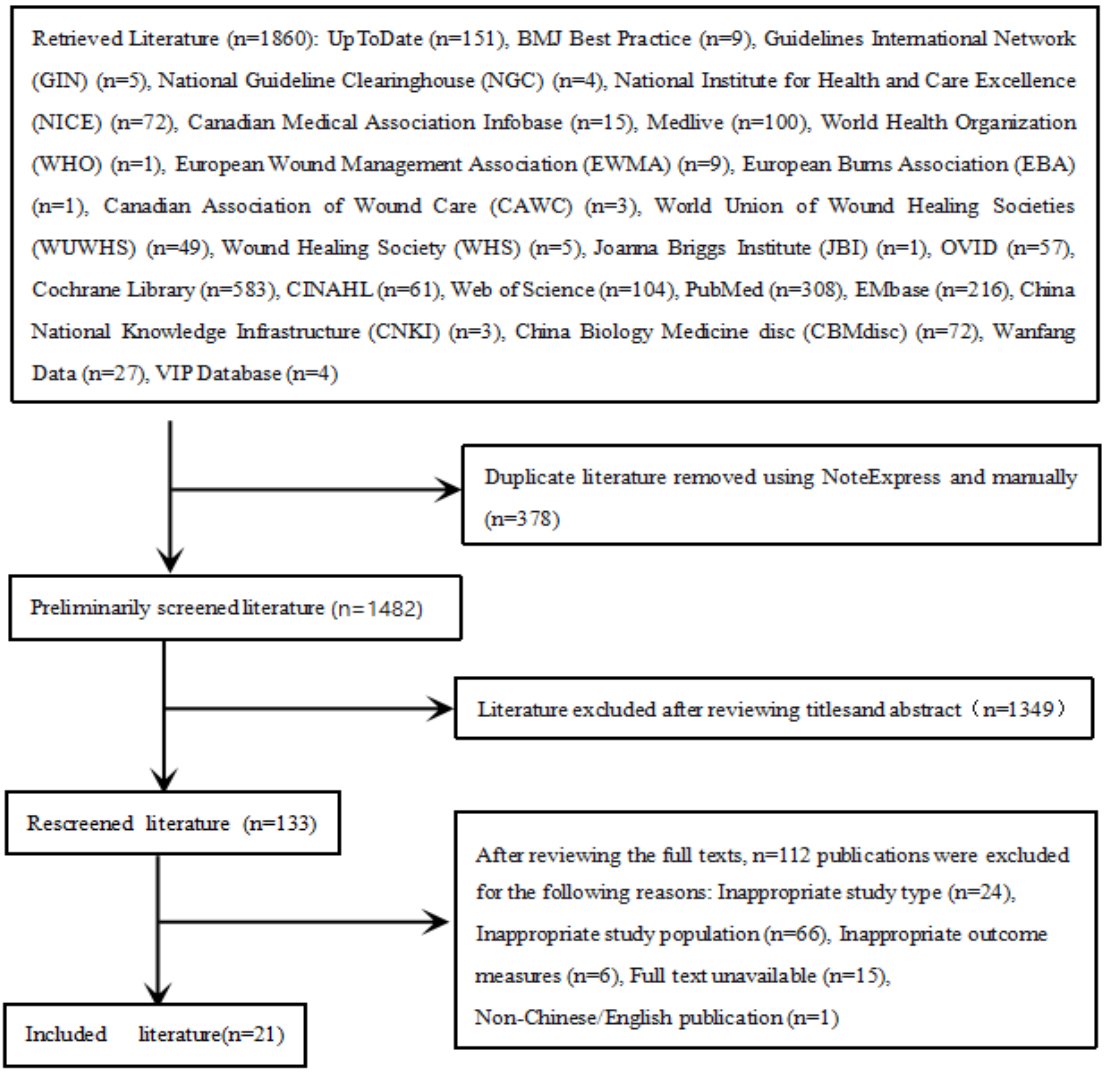

Figure 2. Flowchart of literature screening.

Table 1. Basic characteristics of included literature (*n* = 19)

No.	Literature	Source	Type	Topic
1	Mark 2024 [8]	UpToDate	Clinical Decision Support	Emergency Management of Moderate and Severe Thermal Burns in Children
2	Gerd 2024[16]	UpToDate	Clinical Decision Support	Burn Wound Infection and Sepsis
3	Shelley 2024 [17]	UpToDate	Clinical Decision Support	Management of Burn Pain and Pruritus
4	Mayer 2024 [18]	UpToDate	Clinical Decision Support	Topical Agents and Dressings for Local Burn Wound Care
5	Yoshino et al. 2016 [9]	PubMed	Guideline	Burn Guideline
6	ISBI Practice Guidelines Committee 2016 [20]	PubMed	Guideline	ISBI Practice Guidelines for Burn Care
7	Allorto et al. 2016 [20]	PubMed	Guideline	ISBI Practice Guidelines for Burn Care, Part II

Table 1 (Continued)

No.	Literature	Source	Type	Topic
8	Atiyeh et al. 2017 [21]	WUWHS	Guideline	Effective Skin and Wound Management of Uncomplicated Burns
9	European Burns Association 2017 [22]	European Burns Association	Guideline	European Practice Guidelines for Burn Care
10	Hirche et al. 2020 [23]	PubMed	Guideline	Bromelain-based Enzymatic Debridement (NexoBrid®) for Burn Eschar Removal: European Consensus Guidelines
11	Chinese Society of Burn Surgery, CMA 2021 [24]	Wanfang Med Online	Expert Consensus	National Expert Consensus on the Clinical Application of Eschar Grinding in Burn Wounds
12	Chinese Society of Burn Surgery, CMA 2024 [25]	Wanfang Med Online	Expert Consensus	Expert Consensus on Grade II Burn Wound Treatment I: Pre-hospital Emergency Care and Non-surgical Treatment
13	Chinese Society of Burn Surgery, CMA 2024 [26]	Wanfang Med Online	Expert Consensus	Expert Consensus on Grade II Burn Wound Treatment II: Surgical Treatment and Infection Prevention
14	Chinese Society of Burn Surgery, CMA 2023 [3]	Wanfang Med Online	Expert Consensus	Expert Consensus on the Management of Deep Grade II Burn Wounds in Children
15	Chinese Society of Burn Surgery, CMA 2017 [27]	Wanfang Med Online	Expert Consensus	National Expert Consensus on the Application of Negative Pressure Wound Therapy in Burn Surgery
16	Lou et al. 2024 [29]	Wanfang Med Online	Systematic Review	Systematic Review of the Efficacy and Safety of Negative Pressure Wound Therapy in Pediatric Burns
17	Breederveld et al. 2014 [28]	Cochrane Library	Systematic Review	Systematic Review of Recombinant Human Growth Hormone for Treating Burns
18	Hu et al. 2024 [30]	Web of Science	Systematic Review	Systematic Review and Meta-Analysis of the Efficacy and Safety of Recombinant Human GM-CSF Hydrogel for Treating Grade II or III Burn Wounds in Children
19	Therese et al. 2022 [31]	PubMed	Systematic Review	Duration of Cooling with Water for Thermal Burns: A Systematic Review

3.2. Results of literature quality evaluation

A total of 6 guidelines were included, and the specific results of the AGREE II quality evaluation for the included guidelines are detailed in **Table 2**.

Table 2. Results of methodological quality evaluation of included guidelines (n = 6)

Included guideline	Domain-specific standardized score (%)						Number of domains		Recommendation grade
	Scope & purpose	Stakeholder involvement	Rigor of development	Clarity of presentation	Applicability	Editorial independence	≥ 60%	≥ 30%	
Yoshino [9]	95.23	47.61	92.85	95.23	46.42	100	4	6	B
Isbi Practice Guidelines Committee [19]	94.44	94.44	77.08	100	83.33	100	6	6	A
Allorto et al. [20]	94.44	94.44	77.08	100	83.33	100	6	6	A
Atiyeh et al. [21]	66.67	33.33	54.16	100	60.87	83.33	3	6	B
Europeans Burns Association [22]	100	72.22	62.50	100	78.26	91.67	5	6	A
Hirche [23]	88.89	72.22	64.58	100	87.50	100	6	6	A

A total of 5 expert consensuses were included [3,25–28]. The quality of the expert consensuses was evaluated using the 2016 evaluation tool from the JBI Evidence-Based Health Care Center. Among them, one consensus was rated as "No" for the item "Are there any inconsistencies between the proposed viewpoints and previous literature?", while the rest were rated as "Yes" and were all included [25].

A total of four systematic reviews were included and evaluated using the 2016 version of the authenticity evaluation tool for systematic review papers from the Joanna Briggs Institute (JBI) Evidence-Based Health Care Center in Australia [29–32]. For two of the articles, the evaluation for the item "whether recommendations for policy and/or practice are made based on reported data" was "no," while all other items were rated as "yes" [30,32].

3.3. Summary of best evidence

This study extracted 37 pieces of evidence from six aspects: wound assessment, wound management, wound treatment, topical dressings and medications, fluid resuscitation therapy, and infection identification and management, as shown in **Table 3**.

Table 3. Summary of evidence for wound care management in pediatric burn patients

Evidence theme	Evidence description	Level
Wound Assessment	1. Determine burn extent (percentage of Total Body Surface Area, TBSA) and depth (superficial, partial-thickness, full-thickness). Widely used methods include the Rule of Nines, Lund-Browder chart, and palm method [19,21,23,26]. Smartphone/tablet apps can improve speed and accuracy [8,26].	5b
	2. Document the burn wound photographically with appropriate consent [8].	5c
	3. Burns require an initial assessment, a secondary assessment, and ongoing dynamic assessment for partial-thickness burns [3,26].	5c
Wound Management	4. Initial resuscitation: Remove hot, smoldering, or chemically exposed clothing to prevent further injury [3,8]. Toxic chemicals must be completely removed [20].	5b
	5. Immediate cooling of the burn area with water for at least 20 minutes (water temperature not below 8°C) is recommended. Do not use ice or ice water directly. Monitor for hypothermia. Benefits of cooling beyond 30 minutes are unclear [8,20,32].	2a
	6. For chemical burns: Remove contaminated clothing and materials, irrigate thoroughly with copious water for 45 minutes [8,20].	4c
	7. During transport of severe burns to a burn center, cover wounds with a dry sterile dressing; avoid topical medications [8].	5c
	8. Cleanse burns with mild soap and water or gentle washing with a damp dressing [21]. Initial debridement can be done with gauze soaked in sterile saline [8].	5c
	9. Antiseptics may impair healing and are generally avoided [8]. For partial-thickness burns, low-toxicity agents like chlorhexidine or hypochlorous acid solutions are recommended [26].	5b
	10. Debridement of non-viable tissue (including ruptured blisters) reduces infection risk [3,8,23,26]. For clean deep partial-thickness burns in children, blister fluid can be aspirated initially, and the blister roof preserved for 3-5 days [3]. Blister roofs should be removed in low-temperature scald burns [26].	5b
	11. Enzymatic debridement agents (e.g., collagenase, bromelain) can be used based on wound condition [24,27].	5c
	12. Debridement and dressing changes are painful and should be performed with adequate analgesia [3].	5b
	13. Administer a tetanus booster if the last dose was > 5 years ago and the burn is partial or full-thickness. Give tetanus immunoglobulin if primary immunization is incomplete [8,19].	4c

Table 3 (Continued)

Evidence theme	Evidence description	Level
Wound Treatment	14. Management of deep burns includes skin grafting, tangential excision, etc. [25,27]. Aggressive skin grafting is not recommended for deep partial-thickness burns in infants (< 3 years) [27].	4c
	15. Perform escharotomy for circumferential burns to relieve constriction or pressure [8,21].	4c
	16. Negative Pressure Wound Therapy (NPWT) reduces adverse events. Polyurethane foam is preferred for pediatric burns, changed every 2–3 days. Continuous mode is preferred. Negative pressure should not exceed arterial systolic pressure: < 2 years: -10 to -3.3 kPa; 2–12 years: -10 to -6.6 kPa; 13–18 years: -13.3 to -10 kPa [28,30].	1b
	17. Recombinant human growth hormone may accelerate wound healing in pediatric burns [29].	1b
	18. For pruritus: First-line treatment includes oral antihistamines (e.g., diphenhydramine). Other options include H1/H2 blockers, cyproheptadine, hydroxyzine, tricyclic antidepressants (doxepin). Avoid lanolin-rich products [17,21].	4c
	19. Topical therapies for pruritus include aloe vera, petrolatum-based creams, cocoa butter, mineral oil, hydrogel dressings, topical corticosteroids, topical doxepin, silicone gel sheets, pressure garments, massage [17].	4c
	20. Laser therapy may have a positive effect on pruritus [17].	2c
Topical Dressings & Agents	21. Cover burns adequately with a primary gauze dressing, especially in emergency settings. Apply after topical antibiotic: first layer (non-adherent gauze), second layer (soft, dry gauze), outer layer (elastic bandage roll) [8].	5c
	22. Biologic/synthetic dressings can reduce dressing change frequency, alleviate pain, prevent infection, and promote healing [8]. Other materials include film, foam, alginate, hydrocolloid, hydrogel, silicone-coated polyurethane, cellulose, or silk dressings [16,18,19]. Silver compounds/dressings are effective topical antimicrobials [20].	1b
	23. Dressing change frequency should be adjusted based on exudate but not too frequent to interfere with re-epithelialization [18].	5c
	24. Common topical antimicrobials include: antibiotic ointments, silver sulfadiazine (SSD), bismuth-impregnated petrolatum gauze, mafenide, chlorhexidine. SSD (alone or with cerium) and povidone-iodine are contraindicated in neonates with burns [18].	5c
	25. Recombinant human GM-CSF hydrogel effectively promotes healing of partial or full-thickness burns in children [31].	1b
	26. Choice of agent/dressing depends on wound characteristics, healing stage, change frequency, clinician experience, local resources, and cost [18,23].	5c
Fluid Resuscitation	27. Fluid resuscitation is essential in severe burns, requiring accurate TBSA assessment [8,23]. Initiate for burns ≥ 10% TBSA in children [19,21].	5c
	28. Initiate resuscitation using the Parkland formula [19,21]. Modified Parkland: 4 mL/(kg × %TBSA) + 24-hour maintenance fluid, where TBSA includes only partial and full-thickness burns [8].	5c
	29. Use isotonic crystalloids for the first 24 hours. For children < 20 kg, include 5% dextrose in maintenance fluids to prevent hypoglycemia [8].	4c
	30. Administer half the calculated volume over the first 8 hours post-burn, and the remaining half over the next 16 hours [23].	4c
	31. Monitor urine output to guide resuscitation: 1–2 mL/kg/hour for weight < 30 kg; 0.5–1 mL/kg/hour for weight ≥ 30 kg [8,19,21].	4c
Infection Recognition & Management	32. Rapid clinical deterioration (increased pain, change in wound appearance, intolerance to enteral feeding, systemic signs) may indicate burn wound infection/sepsis [16,27].	5b
	33. Signs of fungal infection: early eschar separation (possibly due to fat liquefaction), rapid spread of subcutaneous edema with central ischemic necrosis [8].	5c
	34. Inflammatory markers and wound microbiology results were incorporated into the diagnostic assessment [16,20,27].	5b
	35. Systemic antibiotic therapy for burn wound infection should be guided by quantitative culture and sensitivity results [19,23,25].	4c
	36. Management includes wound care (cleansing, dressing), antimicrobial therapy (topical ± systemic), and wound excision/debridement, depending on burn type [3,20,27].	5b
	37. Implement strict hand hygiene, patient-isolation, and patient-provider isolation measures to prevent cross-infection [20,27].	4c

4. Discussion

4.1. Dynamic assessment of wounds in pediatric burn patients should be conducted

In this study, the evidence described in items 1 to 3 regarding wound assessment is derived from clinical decision-making and expert consensus, emphasizing the importance of wound assessment. Therefore, it is essential to clarify the area and depth of the wound through assessment in pediatric patients. The study recommends using the Lund-Browder chart to evaluate the percentage of burn area relative to the total body surface area, supplemented by smartphone and tablet applications to assist in area calculation [26].

The application of electronic devices enables the initial wound to be documented in the form of photographs, providing an image basis for the subsequent dynamic assessment of the wound [8]. After burns, due to the continuous action of heat, the wound area and depth of pediatric burn patients undergo dynamic changes. Therefore, burn wound assessment includes initial assessment, re-assessment, and dynamic assessment [8,26,27]. Hence, in clinical practice, the evidence-based summary assessment methods can be referred to for pediatric wound assessment, providing a basis for the treatment of pediatric wounds and the selection of medications and dressings.

4.2. Early management of burn wounds should be based on their characteristics

Evidence 4–13 describes the methods for wound management in pediatric burn patients. Timely and effective management after burns in children is beneficial for reducing the transplantation rate of wounds and promoting wound recovery. In the emergency management of wounds in pediatric burn patients, to prevent further injury, heat sources, charred or clothing exposed to chemicals should be removed, and toxic substances should be cleared [3,8,20].

Regarding the timing of applying cold therapy after burns, current evidence suggests that cold should be applied immediately after burns, with the burned area flushed with cold water for at least 20 minutes or cooled with a cooling gauze applied to the wound. During the application of cold, body temperature changes need to be monitored [8,20,32]. Effective application of cold can reduce the proportion of skin grafting in pediatric wounds [32]. However, the benefits of cold therapy for burn wounds when applied for more than 30 minutes remain to be studied. Since burns mainly occur in home environments and emergency management is primarily carried out by caregivers of pediatric burn patients, the decision to use cold water for wound management is also influenced by the caregivers' level of knowledge [33]. For chemical burns, all contaminated clothing and materials should be removed and disposed of, and chemical burns require a longer washing time than thermal injuries [8,20].

Appropriate methods for wound cleaning and debridement should be selected based on the condition of the wound. Debridement of the wound surface is often accompanied by severe pain, so it is essential to choose an appropriate method for managing wound pain, such as sedation during dressing changes [3]. In addition to the application of analgesic techniques in burned children, the use of virtual reality technology during wound dressing changes can also effectively alleviate pain [34]. Timely and effective wound management facilitates wound healing, reduces the risk of wound infection, and prevents the wound from deepening.

4.3. Precise grading treatment based on burn severity

Evidence 14–20 elaborate on the wound treatment for burned children. Due to variations in burn severity, the treatment approaches for wounds differ. Treatment should be tailored to the characteristics of the wound to promote its recovery. For superficial burns, dressing changes are sufficient, while the management of deep burns

is more complex. Given the heterogeneity of the wound surface in children, techniques such as escharectomy and skin grafting may be necessary during debridement and dressing changes to promote wound healing [25,27]. Burn wounds are often accompanied by inflammatory exudation and the formation of a large amount of necrotic tissue, which can easily lead to wound infection. Negative pressure wound therapy can shorten the wound healing time, and the selection of negative pressure should be based on the child's age [28]. Children with severe thermal injuries often suffer from hypermetabolic syndrome, and recombinant human growth hormone can inhibit the catabolism of burned tissue and shorten the healing time of burn wounds [29]. Severe itching is common during the healing process in burned children, and systemic pharmacological treatment and local physical therapy can be chosen to alleviate itching [17].

4.4. Appropriate dressings and medications help reduce the frequency of dressing changes and promote healing

Evidence items 21–26 describe the selection of topical dressings and medications for burn wounds in pediatric patients. After debridement or surgery for burns, wound dressing changes are necessary for pediatric patients. Basic wound care for children includes covering the wound with gauze and the use of antibiotics [8]. Meanwhile, the use of biological and synthetic dressings helps reduce the frequency of dressing changes in pediatric patients, so the choice of dressing for dressing changes in children should be based on the nature of the wound and its specific requirements [9]. Frequent dressing changes may interfere with the epithelialization process of the wound, so the frequency of dressing changes should be dynamically adjusted in clinical practice based on the amount of wound exudate in pediatric patients [8]. Due to the open nature of the wound, topical antibiotics are required to prevent bacterial colonization and maintain a moist burn environment. Therefore, the selection of topical medications should be based on wound characteristics, healthcare provider experience, local resources, and cost considerations [18].

4.5. Fluid therapy facilitates wound recovery in pediatric burn patients.

Evidence items 27–31 discuss the use of fluid resuscitation after burns. After a burn, pediatric patients experience fluid loss, and early fluid replacement is beneficial for wound recovery. The wound area should be assessed to determine whether fluid resuscitation is necessary for the pediatric patient, with resuscitation required for burns covering more than 10% of the body surface area [8]. The Parkland formula is commonly used to calculate fluid resuscitation volumes in pediatric burn patients, taking into account only second-degree and higher burn areas [8]. During the fluid replacement process for pediatric patients, crystalloid solutions are administered within 24 hours. For pediatric patients with low body weight, a 5% glucose solution is used for fluid replacement to prevent hypoglycemia [8]. Urine output serves as an important indicator of whether fluid replacement in pediatric patients is adequate, and the amount of urine output should be monitored based on the patient's weight [8,19,21].

4.6. Appropriate identification and management of wound infections are necessary

Evidence items 32–37 provide an overview of the management of infected wounds in burn patients. During the course of a burn injury, infection is the most common cause of complications and death, making infection management of burn wounds particularly crucial [16]. Rapid clinical changes in burn patients, such as visible changes in the wound, wound pain, and systemic signs, indicate the presence of infection [27]. The diagnosis

of infection in pediatric burn patients requires examination of inflammatory markers and wound etiology. The wound should be cleaned and dressed, and sensitive medications should be selected for treatment based on the examination results. Severe wounds should undergo wound excision [3]. Healthcare personnel should practice proper hand hygiene to prevent cross-infection of wounds [3].

5. Conclusion

This paper summarizes 37 pieces of best evidence on wound care management for pediatric burn patients from six aspects: wound assessment, wound management, wound surface treatment, topical dressings and medications, fluid therapy, and infection identification and management. The aim is to provide evidence-based practical guidance for clinical healthcare professionals in managing wounds in pediatric burn patients. The evidence in this study is solely based on existing available research findings, with some evidence being of relatively low quality and most of it sourced from English literature. Therefore, during clinical practice, it is recommended that healthcare professionals reasonably adapt and apply the best evidence, taking into account the individual differences among pediatric burn patients, the availability of medical resources, and the characteristics of clinical environments both domestically and internationally.

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Disclosure statement

The authors declare no conflict of interest.

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