Nicklaus Children's Health System

CLINICAL PATHWAYS – INTRODUCTION

Clinical Pathways are guidelines used to assist in the delivery of high-value, effective, efficient, safe, and family-centered care. Pathways have been shown to improve the quality of care for hospitalized children with many conditions and in different settings (1)

A definition of a clinical 'pathway' needs to satisfy four criteria (2)

(1) It is a structured multidisciplinary plan of care.
(2) It is used to translate guidelines or evidence into local practices.
(3) It details the steps in a course of treatment of care in a plan, pathway, algorithm, guideline, protocol, or other "inventory of actions."
(4) It is aimed to assist in standardizing care of a specific population.

These Clinical Decision-Support (CDS) tools are aimed to assist clinicians at the bedside to deliver evidence-based care. The **Algorithm (SECTION 2**) is a visual aid that helps guide clinicians, step-by-step through the timing, indications, and details of recommended tests and treatments for managing specific conditions. In this case, **Burns** is being addressed.

These PATHWAYS and their specific SECTIONS were developed by a consensus of a subject-matter-expert (SME) team, organized by the Clinical Effectiveness and Pathways (CEP) program at Nicklaus Children's Health System (NCHS). The SME team included clinicians from multiple disciplines and pediatric sub-specialties (see SECTION 7).

These clinical pathways are intended to be used as a compilation of best practice recommendations for practitioners. The practice of evidence-based pediatric medicine involves the use of pathways, the clinicians' experiences and judgment, and finally the patient's perspectives and values.
However, these clinical pathways are not intended to constitute specific medical recommendations for treatment. The practitioners must exercise their own independent judgment in applying these tools. These clinical pathways are not a script or 'cookbook' applicable to all patients. NCHS cannot certify that CDS documents are accurate or complete in every aspect. NCHS is not responsible for any errors or omissions in the use of clinical pathways or for any outcomes a patient might experience where a clinician consulted or followed these CDS in providing clinical care.

1-Rising utilization of inpatient pediatric asthma pathways.Kaiser SV, et al. J Asthma. 2017.
2-Lawal AK RT, Kinsman L, Machotta A, Ronellenfitsch U, Scott SD, Goodridge D, et al. What is a clinical pathway? Refinement of an operational definition to identify clinical pathway studies for a Cochrane systematic review. BMC Med 2016;14)

Burns

UCC Phase

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Screen for possible non-accidental trauma

Patient meets inclusion criteria

- Triage/VS as per protocol
- History and PE
- ABCDE assessment (airway, breathing, circulation, disability and exposure)

Is the patient clinically stable?

- **No** → **• Call 911 • Transfer to ED • Consider transfer to Burn Center if meets criteria**
- **Yes** →

- Evaluation of burn
  - Classification of burn (see Burn Classification)
  - Add photos of burn injury to EMR using Capture app
  - Complete Lund & Browder chart

Inclusion Criteria
Patients 0-20 years old presenting with burn injuries

Burn Center Criteria
- 2nd & 3rd degree burn greater than 10% BSA
- 3rd degree burn greater than 5% BSA
- Significant chemical or electrical burn
- Burn with significant inhalation injury
- Significant burn to face, hands, feet, genitalia or perineum

Minor Burn
- Classification:
  - < 5% TBSA
  - Any size superficial thickness
  - < 5% partial thickness
- Interventions:
  - Pain management
  - Wound care as indicated
    - Cleanse with mild soap and saline
    - Apply GlucaonPro
    - Dressing: apply Telfa and Kerlix
    - Dressing changes BID
  - Tetanus Immunization as indicated (refer to Tetanus Prophylaxis for Burns)

Does patient meet discharge criteria?

- **Yes** → **• Contact pediatric surgery to discuss outpatient f/u as indicated • Discharge home**
- **No** → **Call Pediatric Surgery for ED transfer or direct admission**

Moderate Burn
- Classification:
  - 5-10% TBSA
  - 5-10% partial thickness
  - Circumferential burns
- Interventions:
  - Pain management
  - Wound care as indicated
    - cover burn(s) with dry sterile dressing
    - Do NOT apply topical agents
  - Consider IV start and IV fluid with LR as needed
  - Consider CBC, Chem 8
  - Tetanus Immunization as indicated (refer to Tetanus Prophylaxis for Burns)

Transfer to ED via Lifeflight

Major/Severe Burn
- Classification:
  - > 10% TBSA
  - > 10% partial thickness
  - > 5% TBSA full thickness
  - Significant electrical burn
  - Burns to head, face, hand, feet, perineum, near eyes, across joints
- Interventions:
  - IV start, fluid resuscitation with LR (preferred)
  - Pain management
  - Wound care
    - Cover burn(s) with dry sterile dressing. Do NOT apply topical agents
  - Consider Tetanus Immunization as indicated (refer to Tetanus Prophylaxis for Burns)

Transfer out to Burn Center

Discharge Criteria
- No social concerns
- No other medical concerns
- Adequate home pain management
- Adequate follow-up
- For Moderate/Severe Burns, cleared by surgical team (Plastic surgery for hand or facial burns)
- Education for wound care provided to parent/caregiver

Steps for Transfer Out
- If clinically unstable, call 911 to get the patient to a burn center
- If clinically stable, call NCH Transfer Center to transport to nearest OSH Burn Center

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Burns

ED Phase

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Screen for possible non-accidental trauma

Burn Center Criteria
- 2nd & 3rd degree burn greater than 10% BSA
- 3rd degree burn greater than 5% BSA
- Significant chemical or electrical burn
- Burn with significant inhalation injury
- Significant burn to face, hands, feet, genitalia or perineum

Steps for Transfer Out
- If clinically unstable, call 911 if its within 30 minutes of arrival to get the patient to a burn center
- If clinically stable, transfer to OSH Burn Center per provider preference:
  - Arrange for transfer out to Ryder Trauma by calling JMH Transfer Center 855-462-4658
  - Arrange for transfer out to HCA Florida Kendall Hospital by calling South Florida Transfer Center 877-549-9337

Patient meets inclusion criteria

Inclusion Criteria
Patients 0-20 years old presenting with burn injuries

- Triage/VS as per protocol
- History and PE
- ABCDE assessment (airway, breathing, circulation, disability and exposure)

Is the patient clinically stable?

No
- Activate Trauma Alert
- Assess for airway compromise (consider intubation for inhalation injury)
- Provide respiratory support as needed
- Pain management
- IV start, fluid resuscitation with LR (preferred)
- Obtain Trauma labs (see order set ED-trauma lab/rad)

Admit or Transfer out to Burn Center per Pediatric Surgery discretion

Yes
- Evaluation of burn
  - Add photos of burn injury to EMR using Capture app
  - Fill Lund & Browder chart

Minor Burn
- Classification:
  - < 5% TBSA
  - Any size superficial thickness
  - < 5% partial thickness
- Interventions:
  - Pain management
  - Wound care as indicated
  - Tetanus Immunization as indicated (refer to Tetanus Prophylaxis for Burns)

Moderate Burn
- Classification:
  - 5-10% TBSA
  - 5-10% partial thickness
  - Circumferential burns
- Interventions:
  - Pain management
  - Consider IV start and IV fluid as needed
  - Consider CBC, BMP
  - Tetanus Immunization as indicated (refer to Tetanus Prophylaxis for Burns)
  - Wound care as indicated

Major/Severe Burn
- Classification:
  - > 10% TBSA
  - > 10% partial thickness
  - > 5% TBSA full thickness
  - Significant electrical burn
  - Burns to head, face, hand, feet, perineum, near eyes, across joints
- Interventions:
  - IV start
  - Start fluid resuscitation using modified Parkland formula
  - Pain management
  - Wound care
    - Cover burn(s) with dry sterile dressing. Do NOT apply topical agents
  - Consider Tetanus Immunization as indicated (refer to Tetanus Prophylaxis for Burns)

Does patient meet discharge criteria?

Yes
- **Contact pediatric surgery to discuss outpatient f/u as indicated**
- **Discharge home**

No
- **Contact pediatric surgery for admission**

Discharge Criteria
- No social concerns
- No other medical concerns
- Adequate home pain management
- Adequate follow-up
- For Moderate/Severe Burns, cleared by surgical team (Plastic surgery for hand or facial burns)
- Education for wound care provided to parent/caregiver

- Consult Pediatric Surgery
- Consult plastic surgery if isolated facial or hand burn

Does patient meet burn center criteria?

Yes
- **Transfer patient to Burn Center**

No

Does patient meet discharge criteria?

No
- **Contact pediatric surgery for admission**

Yes
- **Discharge home with outpatient follow-up as indicated**

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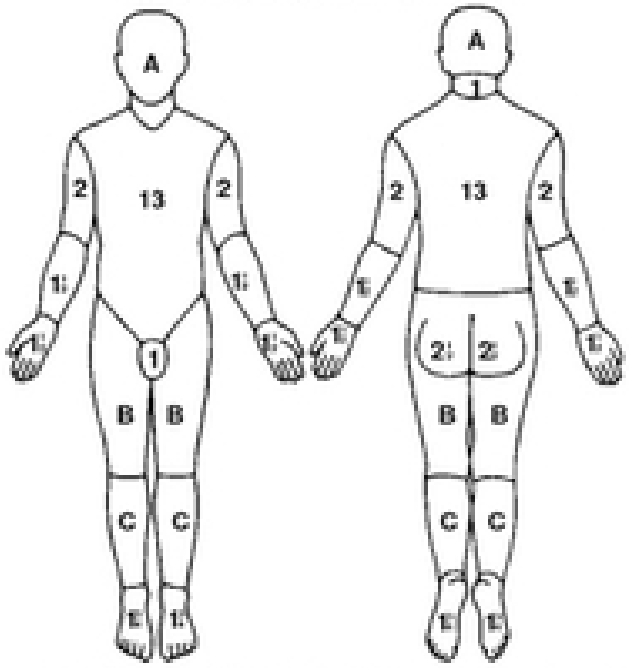
A BURN CHART

NAME_____ WARD_____ NUMBER_____ DATE_____

AGE_____

LUND AND BROWDER CHARTS



Ignore simple erythema.

Superficial

Deep

REGION	%
HEAD	
NECK	
ANT. TRUNK	
POST. TRUNK	
RIGHT ARM	
LEFT ARM	
BUTTOCKS	
GENITALIA	
RIGHT LEG	
LEFT LEG	
TOTAL BURN	

RELATIVE PERCENTAGE OF BODY SURFACE AREA AFFECTED BY AGE

AREA	AGE 0	1	5	10	15	ADULT
A = 1/2 OF HEAD	9 1/2	8 1/2	6 1/2	5 1/2	4 1/2	3 1/2
B = 1/2 OF THIGH	2 3/4	3 1/4	4	4 1/2	4 1/2	4 3/4
C = 1/2 OF ONE LOWER LEG	2 1/2	2 1/2	2 3/4	3	3 1/4	3 1/2

Type of Burn Descriptions

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Type (degree) of burn	Appearance	Course
Superficial (1st degree)	Minor damage Erythematous (pink to reddened skin) Painful Dry without blisters	Heals without scarring in 3-5 days
Partial Thickness (2nd degree)	Partial destruction of dermis Bright pink to cherry red skin with blisters Skin moist, wet, very painful and edematous	Heals in 7-10 days with minimal scarring
Deep Partial Thickness (2nd degree)	Greater than 50% of dermis Moderate eschar/slough or ruptured blisters Less painful because nerves are damaged	Heals in 2-3 weeks Severe scarring can occur Risk of skin scar contracture May require skin grafting
Full Thickness (3rd and 4th degree)	Damage to all skin layers (3rd degree) and may involve fat, muscle, bone (4th degree) Skin is severely charred, waxy white, pale, leathery No bleeding Painless	High risk for infection and fluid loss

Burn Clinical Pathway JOHNS HOPKINS ALL CHILDREN'S HOSPITAL. (2021).
https://www.hopkinsmedicine.org/-/media/files/allchildrens/clinical-pathways/burn-clincial-pathway-6_21_2021.pdf

Wound Care for Minor and Moderate Burns in the ED:

Preferred wound care:

- Step 1: Debridement
  - Cleanse with mild soap and saline
    - Alternative choices: Cetaphil, Vashe
- Step 2: Apply silverlon
- Step 3: Wrap with Kerlix

Alternative wound care:

- Step 1: Debridement
  - Cleanse with mild soap and saline
    - Alternative choices: Cetaphil, Vashe
- Step 2: Apply topical ointment (GlucaonPro or bacitracin)
- Step 3: Dressing
  - Apply Telfa and wrap with Kerlix

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Wound Care Instructions for Discharge:

- Cleanse with mild soap and saline
- Apply GlucaonPro (or other topical as instructed)
- Dressing: apply Telfa and kerlix
- Dressing changes twice per day

Cleanser & Dressing Types

Name ***Cleanser/Dressing Type***	**Instructions for Use**
Cetaphil *Gentle Skin Cleanser*	Apply cleanser to the skin and rub gently. Rinse.
Vashe *Wound Cleaning Solution*	Apply a sufficient amount to cover the wound and surrounding area. Alternatively, may soak gauze with solution and apply to affected area.
GlucaonPro *Occlusive Ointment*	Contains Oat Beta-glucan. Apply liberally to affected area 1-3 times per day. May cover with non-adherent bandage or dressing.
Silverlon *Non-Adherent Antimicrobial Wound Dressing (contains silver)*	Ensure that the product covers the wound bed and overlaps the wound edges. Activate by thoroughly moistening with sterile water or saline. Place silver side down on wound. Secure with outer dressing. May keep in place up to 7 days.
Telfa *Non-Adherent Dressing*	Absorbent cotton bandage that needs to be secured (i.e. via Kerlix).
Kerlix *Sterile Gauze*	Sterile bulky gauze that can be used as a primary wound dressing or as a secondary dressing for extra bulk, cushioning, and conforming.
Mepilex Ag *Silicone Foam Adherent Dressing (contains silver)*	Ensure that the product covers the wound bed and overlaps the wound edges. Cut to appropriate size (if needed). Remove the release films and apply the adherent side to the wound. Do not stretch. May cover with additional dressings. May keep in place up to 7 days.
Mepitel Ag *Silicone Foam Dressing Layer (contains silver)*	Ensure that the product covers the wound bed and overlaps the wound edges. Cut to appropriate size (if needed). Remove the small film and apply to affected area. Do not stretch. Remove remaining large film and smooth dressing over wound. Secure with outer dressing. May keep in place up to 7 days.

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Topical Antimicrobial Agents

In general, ointments/creams should be applied thick enough to cover wound and to keep wound moist then covered with a nonadeherent dressing. Dressings containing ointments/creams should be cleaned and changed approximately every 12 hours. Ointments are generally more occlusive, more lubricating, and better tolerated compared to creams due to soothing properties as well as ease of application and cleaning. Topical antimicrobial agents are ineffective when placed on intact blisters; may be placed on blisters that have ruptured.

Medication	Dosing and Frequency	Notes
Bacitracin Zinc *500 units/gram*	Apply to affected area 1 - 3 times per day until wound has epithelialized	• Do not use in eyes or over large areas. • Effective against gram-positive cocci and bacilli. • Use on healed burns may promote colonization with yeast. • Use on large areas is not recommended as systemic absorption has been reported. Systemic absorption may lead to nephrotoxicity and neurotoxicity.
Bacitracin Zinc and Polymyxin B *500 units/gram and 10,000 units/gram*	Apply* to affected area 1 - 3 times per day until wound have epithelialized	
Silver Sulfadizine 1%	Apply to a thickness of 1/16 inch 1 - 2 times per day	• Avoid in patients with sulfa allergies. • Use with caution on face, particularly near the eyes. • Use not recommended in infants <2 months due to risk of kernicterus. • Effective against gram-negative (e.g. *E. coli, Enterobacter, and Pseudomonas*) and gram-positive (e.g. *Staphylococcus aureus*) bacteria as well as some yeasts. • May impair wound healing.

Tetanus Prophylaxis for Burns

History of Tetanus Immunization Doses	Tetanus Vaccine*	Immune Globulin (TIG)
Uncertain or < 3 doses	Yes	Yes
≥ 3 doses	Only if ≥ 5 years since last dose	No**

For children ≤6 years of age:* ***DTaP.* *For children ≥7 years:* ***Tdap.***
(In patients who have previously been vaccinated with Tdap, either Td or Tdap may be used.)

***For patients with HIV infection or severe immunodeficiency, Tetanus Immune Globulin should be administered, regardless of history of tetanus immunization.*

Abbreviations: **DTaP** = Diphtheria and Tetanus Toxoids, and Acellular Pertussis (formulation for age <7 years; Daptacel, Infanrix); **Td** = Diphtheria and Tetanus Toxoids (TDVax, Tenivac); **Tdap** = Diphtheria and Tetanus Toxoids, and Acellular Pertussis (Adacel or Boostrix [formulations for age ≥7 years]); **TIG** = Tetanus Immune Globulin

Fluid Resuscitation

Utilize the Modified Parkland Formula below to determine the initial rate of fluid.*
Lactated Ringers (LR) is preferred over other isotonic fluids (i.e. Sodium Chloride 0.9%; NS).

Step 1:

3 mL x (weight in kg) x (% Burn) = 24 hour total in mLs

Step 2:

24 hour total (mL) / 16 = Starting hourly rate in mL/hr

**If the patient has received significant fluid volumes prior to arrival, may subtract amount of fluid given (in mLs) from 24 hour total at discretion of attending.*

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6. *UpToDate*. (2024). UpToDate. https://www.uptodate.com/contents/treatment-of-minor-thermal-burns?search=burn&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1

7. Palmieri, Tina L., and David G. Greenhalgh. "Topical treatment of pediatric patients with burns: a practical guide." *American journal of clinical dermatology* 3.8 (2002): 529-534.

Return to UCC Phase

Return to ED Phase

Approval and Citation

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UCC

1. Pathway Utilization
2. LOS
3. Revisits
4. Direct Cost

Emergency Department

1. Pathway Utilization
2. LOS
3. Revisits to the ED within 72 hours
4. Direct Cost

Inpatient

1. Pathway Utilization
2. LOS
3. Readmission within 30 days
4. Direct Cost

ICD-10 Codes

- T20 Burn and Corrosion of Head, Face, and Neck
- T21 Burn and Corrosion of Trunk
- T22 Burn and Corrosion of Shoulder and Upper Limb, except Wrist and Hand
- T23 Burn and Corrosion of Wrist an Hand
- T24 Burn and Corrosion of Lower Limb, except Ankle and Foot
- T25 Burn and Corrosion of Ankle and Foot
- T26 Burn and Corrosion Confined to Eye and Adnexa
- T27 Burn and Corrosion of Respiratory Tract
- T28 Burn and Corrosion of Other Internal Organs
- T30 Burn and Corrosion, Body Region Unspecified
- T31 Burns Classified According to Extent of Body Surface
- T32 Corrosions Classified According to Extent of Body Surface involved

Nicklaus Children's Health System

CLINICAL EFFECTIVENESS / PATHWAYS PROGRAM

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Pharmacy: Jennifer Ryder

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Executive Approval

Marcos Mestre: SVP and Chief Clinical Operations Officer

Approval by CEP: 12/9/25
NCHS- SYSTEM-WIDE Go-live date: 1/23/26