



## Evaluation & Management of a Patient with Thermal Injury

Description of the Activity	<p>Thermal injuries are a common problem encountered by critical care physicians. These injuries encompass hyperthermic, hypothermic, chemical, and electrical etiologies. All surgical intensivists should be able to perform initial management and stabilization and direct the timing and sequence of subsequent therapies.</p>
Functions	<ul style="list-style-type: none"><li>❖ Resuscitation<ul style="list-style-type: none"><li>➤ Demonstrate an understanding of and use institutional resources, including response systems and decontamination for patients with thermal injury.</li><li>➤ Identify the potential for inhalation injury or airway compromise, with consideration of difficult airway management and complex mechanical ventilation strategies.</li><li>➤ Deploy a validated method to assess the magnitude of thermal injury (size, depth).</li><li>➤ Initiate goal-directed fluid resuscitation for patients with thermal injuries, and address vascular access considerations.</li><li>➤ Identify failure to meet resuscitation endpoints, and adjust resuscitation strategies accordingly.</li><li>➤ Employ a plan for thermoregulation with consideration of passive and active strategies, anticipating the physiologic derangements associated with extremes of core body temperature.</li><li>➤ Address initial wound care and analgesia.</li><li>➤ Recognize the potential for associated injuries after thermal mechanisms, and perform a comprehensive assessment.</li><li>➤ Recognize the indications for escharotomy, fasciotomy, and bronchoscopy after thermal injury, and facilitate the performance of these procedures when indicated.</li><li>➤ Demonstrate understanding of the technical aspects of bronchoscopy and escharotomy.</li></ul></li><li>❖ Ongoing Management<ul style="list-style-type: none"><li>➤ Coordinate wound management, including topical antimicrobial therapy, specialized modalities, timing of debridement, and reconstructive options.</li><li>➤ Identify infectious complications, and initiate next steps in management, employing guideline-directed treatments and antibiotic stewardship principles.</li><li>➤ Address pain management and sedation needs, incorporating multimodal analgesia, including nonpharmacologic therapies, strategies to minimize delirium, and consideration of long-term objectives.</li><li>➤ Direct a nutritional evaluation, including rapid assessment of premorbid nutritional status and implementation of an action plan that encompasses nutritional needs and goals.</li><li>➤ Coordinate care between consulting and ancillary services.</li><li>➤ Communicate an updated plan of care to a patient/caregiver(s) to ensure understanding of the illness severity, prognosis, additional treatment options, and feasibility of carrying out the plan within the patient's psychosocial and socioeconomic context.</li></ul></li></ul>



## Evaluation & Management of a Patient with Thermal Injury

	<ul style="list-style-type: none"><li>❖ Transition of Care<ul style="list-style-type: none"><li>➤ Recognize and manage limitations in resource allocation, and initiate timely transfer using established criteria to an appropriate facility.</li><li>➤ Address the need for long-term wound care planning, incorporating destination reconstruction and therapy.</li><li>➤ In complex patient care scenarios, lead the team in weighing the risks, benefits, and goal concordance of possible therapies, using the assistance of subspecialty palliative care and ethics teams as needed.</li><li>➤ Anticipate long-term psychosocial effects and early engagement in available resources.</li><li>➤ In the event that disease has become acutely life-limiting and there are no additional disease-directed treatments, identify the end-of-life stage of care, and lead the team in helping patients/caregivers into this stage, prioritizing comfort and symptom-directed therapy as indicated.</li></ul></li></ul>
Scope	<ul style="list-style-type: none"><li>❖ In scope<ul style="list-style-type: none"><li>➤ Burn (thermal and chemical)</li><li>➤ Cold-induced injury (frostbite, frostnip, chilblains)</li><li>➤ Electrical injury</li><li>➤ Hypothermia/hyperthermia</li><li>➤ Inhalation injury</li><li>➤ Stevens-Johnson syndrome/toxic epidermal necrolysis/toxic shock syndrome</li><li>➤ Thermal injury involving children and adolescents</li></ul></li></ul>



## Evaluation & Management of a Patient with Thermal Injury

Level	Resuscitation	Ongoing Management	Transition of Care
<p><b>1</b></p> <p><b><u>Limited Participation</u></b></p> <p>Demonstrates limited critical care knowledge and skills</p> <p><b><u>Framework:</u></b></p> <p>What a learner directly out of residency should know</p> <p>Performs ICU procedures on straightforward patients but requires supervision/direction for more complex patients/procedures</p> <p>Requires continuous direct supervision by the attending for patient management</p>	<ul style="list-style-type: none"><li>Identifies situations in which inhalation injury may occur</li><li>Initiates fluid resuscitation relevant to the size and type of thermal injury with prompting; identifies some of the goals of resuscitation (urine output, lactate)</li><li>Requires prompting to ensure activation of institutional burn and decontamination protocols</li><li>Assesses the magnitude of thermal injury; initiates wound management with active direction</li><li>Obtains core body temperature; addresses thermoregulation with prompting</li><li>Performs primary and secondary surveys and obtains history</li><li>With prompting, updates a caregiver(s) on a patient's condition and anticipated treatment course and confirms code status</li></ul>	<ul style="list-style-type: none"><li>In a patient with inhalation injury, recognizes the need for modified ventilatory strategies, requiring assistance to implement them</li><li>Requires active assistance to incorporate fluid and electrolyte balance into a nutritional support plan</li><li>Performs basic wound management with active assistance in a straightforward patient</li><li>Recognizes and addresses infectious complications with assistance</li><li>Provides pain and sedation treatment when indicated</li><li>With prompting, requests a multidisciplinary consultation (eg, PT, OT) and implements recommendations</li><li>With prompting, recognizes the indications for escharotomy and bronchoscopy, requiring direct supervision to perform them</li><li>Communicates an updated plan to a patient/caregiver(s)</li></ul>	<ul style="list-style-type: none"><li>With prompting, initiates patient transfer for specialized care when meeting institutional criteria</li><li>Develops a long-term wound care plan with coaching</li><li>Requires prompting to consult services (plastic, reconstructive surgery) to assist with long-term wound care as needed</li><li>Consults palliative and recovery services</li><li>Participates in a goals-of-care and end-of-life discussion with coaching</li></ul>
<p><b>2</b></p> <p><b><u>Direct Supervision</u></b></p> <p>Initiates straightforward management for many critical illnesses but requires</p>	<ul style="list-style-type: none"><li>Recognizes a situation in which inhalation injury may occur and initiates management, requiring prompting to perform comprehensive management</li></ul>	<ul style="list-style-type: none"><li>Modifies ventilatory strategies with direct supervision for a patient with an inhalation injury</li></ul>	<ul style="list-style-type: none"><li>Initiates patient transfer for specialized care when meeting institutional criteria</li><li>Develops a long-term wound care plan</li></ul>



## Evaluation & Management of a Patient with Thermal Injury

Level	Resuscitation	Ongoing Management	Transition of Care
<p>active direction for further management and complex critical illnesses</p> <p><b>Framework:</b></p> <p>Demonstrates a sufficient fund of knowledge for basic critical care and some knowledge of complex critical illness</p> <p>Performs ICU procedures on straightforward patients but may require supervision/direction for more complex patients/procedures</p> <p>The attending gives active help throughout to direct the clinical course.</p>	<ul style="list-style-type: none"><li>• Initiates fluid resuscitation in a patient and tailors it to resuscitation endpoints</li><li>• Ensures activation of institutional burn and decontamination protocols</li><li>• Assesses the magnitude of thermal injury (including complicating factors such as burn type and location) and initiates wound management with some direction; with prompting, evaluates for associated injuries</li><li>• Initiates maneuvers to address thermoregulation with some guidance</li><li>• Performs a primary and secondary survey and obtains a history, including comorbid conditions</li><li>• Updates a caregiver(s) regarding a patient's condition and anticipated treatment course and confirms code status</li></ul>	<ul style="list-style-type: none"><li>• Requires some assistance to incorporate fluid and electrolyte balance into a nutritional support plan; preferentially initiates enteral nutrition</li><li>• Performs wound care management for a straightforward patient, requiring assistance for a more complex patient; with direction, plans operative intervention if needed</li><li>• With prompting, incorporates preventative strategies to mitigate infectious complications</li><li>• Adjusts the pain and sedation plan for a straightforward patient</li><li>• Requests multidisciplinary consultations (eg, PT, OT) and implements recommendations with guidance</li><li>• Recognizes indications for escharotomy and bronchoscopy and performs these procedures in a straightforward patient with some guidance</li><li>• Communicates an updated plan and consensus opinion on prognosis to a patient/caregiver(s)</li></ul>	<ul style="list-style-type: none"><li>• Consults services (plastic, reconstructive surgery) to assist with long-term wound care</li><li>• Consults palliative and recovery services and coordinates care for a straightforward patient</li><li>• Participates in prognostic, goals-of-care, and end-of-life care discussions</li></ul>
<p><b>3</b></p> <p><b>Indirect Supervision</b></p> <p>Manages most critical illnesses but may require guidance for more complex</p>	<ul style="list-style-type: none"><li>• Identifies situations in which inhalation injury and need for airway management may occur and intervenes immediately</li></ul>	<ul style="list-style-type: none"><li>• Modifies ventilatory strategies with limited supervision to include complex modes and difficult ventilatory weaning in a patient with inhalation injury</li></ul>	<ul style="list-style-type: none"><li>• Directs patient allocation to appropriate specialty treatment centers when resource limitations have been reached</li><li>• Develops a long-term wound care plan and provides anticipatory guidance to a</li></ul>



## Evaluation & Management of a Patient with Thermal Injury

Level	Resuscitation	Ongoing Management	Transition of Care
<p>patients or atypical presentations</p> <p><b>Framework:</b></p> <p>Demonstrates a sufficient fund of knowledge for basic and most complex critical care</p> <p>Independently performs most ICU procedures and supervises procedures on straightforward patients</p> <p>The learner can manage a critically ill patient in straightforward circumstances but may require input to manage the most complicated ICU patients.</p>	<ul style="list-style-type: none"><li>• Initiates fluid resuscitation and identifies when fluid resuscitation endpoints are not met</li><li>• Notifies supervisors to activate institutional management plans for mass casualty and decontamination protocols</li><li>• Rapidly assesses the magnitude of thermal injury, including burn size, depth, location, and type (eg, scald, contact) and the potential for associated injuries; initiates wound management with intermittent direction</li><li>• Initiates measures to correct thermoregulation abnormalities (eg, active and passive measures)</li><li>• Identifies comorbid conditions that may affect overall thermal injury care</li><li>• Participates in a structured goals-of-care discussion with caregiver(s) that includes the anticipated course of care</li></ul>	<ul style="list-style-type: none"><li>• Formulates a nutritional plan for a complex patient with minimal assistance, taking into account enteral and parenteral access</li><li>• Directs wound management with early debridement and grafting for a straightforward patient, requiring some assistance for a more complex patient</li><li>• Implements evidence-based protocols to manage infectious complications; with intermittent direction, recognizes the potential for fungal and atypical infections</li><li>• Implements and modifies a pain and sedation management plan as requirements change</li><li>• Requests multidisciplinary consultations (eg, PT, OT) and coordinates recommendations</li><li>• Independently identifies the need for and performs procedures such as escharotomy and bronchoscopy</li><li>• Directs consultative services to formulate a consensus opinion regarding the treatment plan and prognosis and communicates it to a patient/caregiver(s); provides an appraisal of overall care and anticipated recovery to a caregiver(s)</li></ul>	<p>patient/caregiver(s) and treatment teams regarding expectations</p> <ul style="list-style-type: none"><li>• Anticipates and consults services (plastic, reconstructive surgery) to assist with long-term wound care</li><li>• Consults palliative and recovery services and coordinates care for a complex patient</li><li>• Uses shared decision-making and a multidisciplinary team approach during a goals-of-care discussion</li></ul>



## Evaluation & Management of a Patient with Thermal Injury

Level	Resuscitation	Ongoing Management	Transition of Care
<p><b>4</b></p> <p><b><u>Practice Ready</u></b></p> <p>Independently manages complex critical illnesses and leads the critical care team</p> <p><b><u>Framework:</u></b></p> <p>Demonstrates an attending-level fund of knowledge</p> <p>Independently performs and supervises procedures</p> <p>The attending is available at the request of the learner but is not routinely needed for common or complex critical illness.</p>	<ul style="list-style-type: none"><li>Independently manages inhalation injury, including the difficult airway</li><li>Tailors the resuscitation strategy for a complex patient; adjusts the fluid resuscitation strategy when endpoints are not met</li><li>Proactively triggers institutional management plans for mass casualty and decontamination protocols; manages and coordinates institutional resources based on patient volume and burden of injury</li><li>Rapidly assesses the magnitude of thermal injury, including burn size and depth and type of burn, and identifies associated injuries; initiates wound management independently</li><li>Independently manages comorbid conditions as they affect overall thermal injury care</li><li>Conducts a structured goals-of-care discussion with a caregiver(s) that includes prognosis, prognostication information, and anticipated course of care</li></ul>	<ul style="list-style-type: none"><li>Independently modifies ventilatory strategies to include complex modes and difficult ventilatory weaning for a patient with severe inhalation injury</li><li>Advises the team on advanced nutritional considerations, such as micronutrient deficiencies, specialized formulations, and metabolic side effects</li><li>Supervises complex wound management with early debridement and grafting; selects skin substitutes; modifies treatment for a patient with comorbid conditions that impede wound healing</li><li>Incorporates preventative strategies to mitigate infectious complications; recognizes the occurrence of infections and initiates treatment, recognizing the potential for fungal and atypical infections</li><li>Tailors sedation and pain management for a patient with a complex pain syndrome</li><li>Obtains multidisciplinary consultations (eg, PT, OT) and coordinates recommendations for a complex patient (eg, with multiple injuries, comorbidities)</li><li>Supervises team members when performing procedures, including escharotomy and bronchoscopy</li></ul>	<ul style="list-style-type: none"><li>Facilitates and directs patient allocation to specialty treatment centers during local and regional response</li><li>Supervises the management of complex wound care and provides anticipatory guidance regarding long-term care and expectations</li><li>Facilitates consistent communication with multidisciplinary team(s) to formulate consensus opinion regarding prognosis</li><li>Coordinates palliative and recovery services for a complex patient</li><li>Resolves conflicts and discrepancies between multidisciplinary teams and patient/caregiver(s) using available resources and psychosocial support services</li></ul>



## Evaluation & Management of a Patient with Thermal Injury

Level	Resuscitation	Ongoing Management	Transition of Care
		<ul style="list-style-type: none"><li>Provides a comprehensive appraisal of overall care and likely trajectory of recovery to caregiver(s), incorporating cultural considerations; resolves conflict regarding consensus opinion on a patient's treatment plan and prognosis</li></ul>	