



**REGION 11
CHICAGO EMS SYSTEM
PROTOCOL**

Title: Topical Chemical Burn – BLS/ALS
Section: Toxins and Environmental
Approved: EMS Medical Directors Consortium
Effective: July 10, 2024

TOPICAL CHEMICAL BURN – BLS/ALS

I. PATIENT CARE GOALS

1. Rapid recognition of a topical chemical burn and initiation of appropriate intervention.
2. Transport of significant topical chemical burn to a Burn Center.

II. PATIENT PRESENTATION

A. Inclusion Criteria

1. Patients of all ages who have sustained exposure to a chemical that can cause a topical chemical burn which may develop immediate, or in some cases a delayed, clinical presentation.
2. Agents that are known to cause chemical burns include alkalis, acids, organic compounds, or vesicant chemical agents.

B. Exclusion Criteria

None

III. PATIENT MANAGEMENT

A. Assessment

1. Apply appropriate personal protective equipment (PPE).
2. Remove the patient's clothing, if necessary. Contaminated clothing should preferably be placed in double bags.
3. Clinical effects and severity of a topical chemical burn is dependent upon:
 - a. Class of agent (alkali injury or acid injury)
 - b. Concentration of the chemical (higher concentration, greater the risk of injury)
 - c. pH of the chemical
 - i. Alkali: Increased risk with pH greater than or equal to 11
 - ii. Acid: Increased risk with pH less than or equal to 3
 - d. Onset of burn
 - i. Immediate
 - ii. Delayed (e.g., hydrofluoric acid)
4. Calculate the estimated total body surface area that is involved.



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5. Prevent further contamination.
6. Assess for ocular or oropharyngeal exposure; evaluate for airway compromise secondary to spasm or direct injury associated with oropharyngeal burns.
7. Some acid and alkali agents may manifest systemic effects.

B. Treatment and Interventions

1. If dry chemical contamination, carefully brush off solid chemical prior to flushing the site as the irrigating solution may activate a chemical reaction.
2. If wet chemical contamination, flush the patient's skin (and eyes, if involved) with copious amounts of water or normal saline.
3. Provide adequate analgesia per the Pain Management Protocol.
4. For eye exposure, administer continuous flushing of irrigation fluid to eye.
5. Assess the need for airway management if there is airway compromise or bronchospasm associated with oropharyngeal burns.
6. Take measures to minimize hypothermia.
7. Initiate intravenous fluid resuscitation if necessary to obtain hemodynamic stability.

C. Special Treatment Considerations

1. Hydrofluoric Acid (HF)

A highly corrosive substance that is primarily used for automotive cleaning products, rust removal, porcelain cleaners, etching glass, cleaning cement or brick, or as a pickling agent to remove impurities from various forms of steel. Hydrofluoric acid readily penetrates intact skin and there may cause underlying tissue injury. It is unlikely that low concentrations of hydrofluoric acid will cause an immediate acid-like burn, however there may be delayed onset of pain to the exposed area. Higher concentrations of hydrofluoric acid may cause immediate pain as well as more of a burn appearance that can range from mild erythema to an obvious burn. An oral or large dermal exposure can result in significant systemic hypocalcemia with possible QT prolongation and cardiovascular collapse.

For all patients in whom a hydrofluoric acid exposure is confirmed or suspected:

- a. Vigorously irrigate all affected areas with water or normal saline for a minimum of 15 minutes.
- b. Apply a cardiac monitor for oral or large dermal hydrofluoric acid exposures.



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- c. Hydrofluoric acid exposure is very painful. Hydrofluoric acid exposure typically causes pain out of proportion to the visible dermal effects. Minimal skin changes may exist with substantial exposures.
- d. For patients who have ingested hydrofluoric acid or who have a large dermal exposure consider administration of intravenous calcium chloride, 1 gram of 10% solution, as symptomatic hypocalcemia can precipitate rapidly as manifest by muscle spasms, seizures, hypotension, ventricular arrhythmias, and QT prolongation.

D. Patient Safety Considerations

- 1. Take measures to prevent the patient from further contamination through decontamination.
- 2. Take measures to protect EMS personnel and others from contamination.
- 3. Information regarding the chemical should be gathered while on scene including the Safety Data Sheet (SDS), if available.
- 4. Communicate all data regarding the chemical to the receiving facility.
- 5. Do not attempt to neutralize an acid with an alkali or an alkali with an acid as an exothermic reaction will occur and cause serious thermal injury to the patient.
- 6. Transport to a Burn Center should be considered for chemical burns that involve a significant percentage of total body surface area or burns that involve the eyes, face, hands, feet, or genitals.

III. NOTES/EDUCATIONAL PEARLS

A. Key Considerations

- 1. IV fluid resuscitation should be guided by patient age for a significant burn. If the patient is not in shock, begin initial fluid rates for the prehospital setting:
 - a. ≤ 5 years old: 125 ml normal saline per hour
 - b. 6-12 years old: 250 ml normal saline per hour
 - c. ≥ 13 years of age and older: 500 ml normal saline per hour
- 2. Since the **severity of topical chemical burns is largely dependent upon the type, concentration, and pH of the chemical involved** as well as the body site and surface area involved, it is imperative to obtain as much information as possible while on scene about the chemical substance by which the patient was exposed. The information gathering process will often include:
 - a. Transport of a sealed container of the chemical to the receiving facility;



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- b. Transport of the original or a copy of the Safety Data Sheet (SDS) of the substance to the receiving facility;
 - c. Contacting the reference agency to identify the chemical agent and assist in management (e.g., CHEMTREC®).
3. Inhalation of hydrofluoric acid should be considered in any dermal exposure involving the face and neck or if clothing is soaked in the product.
 4. Decontamination is critical for both acid and alkali agents to reduce injury. Removal of chemicals with a low pH (acids) is more easily accomplished than chemicals with a high pH (alkalis) because alkalis tend to penetrate and bind to deeper tissues.
 5. Some chemicals will also manifest local and systemic signs, symptoms, and bodily damage.

B. Pertinent Assessment Findings

1. An estimate of the total body surface area that is involved.
2. Patient response to therapeutic interventions.
3. Patient response to fluid resuscitation.
4. Patient response to analgesia.