

BroadcastMed | EMS Series_ Burns - Ryan Howard, MSN, RN, CNL - MUSC Children's Health

I'm Ryan Howard.

I'm the pediatric burn program manager here at MUSC Children's Health.

I've been within the facility for the past 10 years, and today we're going to be discussing the initial assessment and management of a pediatric burn patient.

Quick disclosure that the pictures within this slideshow presentation are for educational purposes only.

The objectives today are to identify the components of the primary and secondary survey of the pediatric burn patient, compare the appearance of a partial versus a full-thickness burn, and to identify special criteria for possible child abuse.

Here at MUSC Children's Health, our pediatric burn team has a service approach.

We have four pediatric surgery attendings, and myself, the pediatric burn program manager.

We have a child life specialist, a pharmacist and a nutrition specialist, physical therapy, occupational therapy, a social worker, and then we also staff an inpatient and outpatient clinic facility.

Common causes of a burn injury are thermal-- which can be subdivided into flame, scald, and contact-- chemical, and electrical.

Thermal burns are frequently occurring with exposure to fire and flames, scalds from hot liquids, or contact from hot objects.

Thermal burns occur from outdoor fires, camp fires, burning trash, leaves, house fires-- think of a house fire and an inhalation injury.

Our pediatric population is known to play with lighters and catch their clothes on fire.

Some patients like to throw accelerants on campfires and when they're outside burning leaves and trash.

Fire and flame injuries are commonly seen in older children and adults.

Scald injuries occur, the majority of the time, in the home.

This is 30% of all the burn injuries that we see.

Common causes include hot tap water, food spills, grease, ramen noodles taken out of the microwave, or when the patients are cooking without supervision from an adult.

These scald injuries frequently occur to the anterior trunk, arms, face, and neck.

When there's an immersion-- a stocking/glove appearance-- we're going to suspect an intentional injury.

The patient population that's at risk for scald injuries is young children because they are frequently playing in the kitchen or cooking without supervision, as I mentioned earlier.

Contact injuries occur in the workplace or around the home and they often involve hands, feet, and arms.

Children and adults are at risk for contact burn injuries.

Some of the common causes of contact injuries that we see are patients touching the lawnmower mufflers, clothing irons or a curling iron, a hair straightener, when patients touch a space heater or a fireplace, the fireplace glass, ovens, hot outdoor grills, hot coals, or we sometimes see a contact injury when there's an ATV or a dirt bike incident.

Chemical injuries can occur from contact, ingestion, inhalation, and we even frequently see IV infiltrates which cause a chemical injury.

Ingestion is more commonly seen in the pediatric patient population, and a contact chemical burn is seen from a spill or a work-related injury.

When we're determining the severity of a chemical injury, we need to know what the skin was exposed to.

How long was the skin in contact with this chemical?

What's the agent's concentration, volume, and what's the mechanism of action?

Tissue damage can continue after the initial exposure until the agent is removed.

Chemical injuries frequently affect the hands and the feet, also the anterior body.

The patient population that's more at risk for a chemical injury is frequently seen in the adults.

Electrical injuries.

The major concern is the disruption of the normal cardiac electrical activity.

You need to look for entrance and exit sites.

There may be deep tissue damage that's not visible on the surface.

Sometimes these electrical injuries can cause secondary flame and flash burns as well.

Now we're going to discuss the emergency management principles for a burn patient.

Stop the burning process.

You need to remove the clothing from the burned area, flush the chemicals off the area, remove the source of electrical current, and remove all jewelry from injured limbs.

When we're determining our primary and secondary survey and doing our assessment, we need to look at the history of the injury.

Was this patient in an enclosed space?

Is there smoke inhalation that's involved?

Were there chemicals involved?

Is there another related trauma injury?

What's the patient's medical history?

Do they have a pre-existing disease?

Are they on medications?

Do they have any allergies?

Were there drugs and alcohol involved?

And what's their immunization status?

When patients fall into burning leaves or a fire pit, there can be soot on their face and people are concerned for an inhalation injury.

If a patient's outside, there is little to no chance of an inhalation injury.

So that's where we're talking about, was the patient inside the house?

In the bathroom?

Outside?

Emergency airway management.

Upper airway injury is usually heat-related, and our physical findings are going to include facial burns, singed nasal and facial hair, edema of the tongue, hoarseness, increased respirations, flaring of the nostrils, and retractions.

This is usually an immediate onset.

Lower airway injuries are usually chemical-related, and our physical findings are going to include sooty sputum, bronchospasms, deteriorating ABGs.

The initial chest X-ray will be unremarkable.

Physical findings usually have a delayed onset.

In treatment for the emergency airway management, humidified oxygen and early intubation.

These patients have severe edema.

Edema occurs rapidly, so we need to intubate early.

The circulatory management.

There are massive fluid losses in the burn patient, and this can result in induced increased capillary permeability.

The result is massive third-spacing fluid losses, a decreased plasma and blood volume, decreased cardiac output, and possible hypovolemic shock.

For the circulatory management, we want to insert two large-bore IV catheters, preferably through the non-burned skin area.

We're going to start fluid resuscitation for patients with a total body surface area of 10% or greater.

We're going to discuss the total body surface area in the next few slides.

The formula for the first 24-hour fluid resuscitation-- the Parkland formula-- for the pediatric burn patients is 3 milliliters of lactated Ringer's times the patient's weight, times the total body surface area.

In this formula, half of the volume is given in the first eight hours.

The second eight hours is a fourth of the total volume, and the third eight hours is the remaining fourth of the volume.

A big thing to remember is we're calculating from the time of injury-- not from the time that treatment was initiated.

Children also are going to require maintenance fluids in addition to the resuscitation fluids.

In order to monitor our fluid resuscitation, accurate urinary output measures are very important, and they are the best way to monitor resuscitation efforts and ensure that there's adequate kidney function.

Urinary output requirements if the patient is less than 30 kilograms, they should have 1 to 2 milliliters per hour.

If the patient is greater than 30 kilograms, they should have 30 to 50 milliliters per hour.

Other issues involved in the emergency management process.

NG tubes are usually placed in all patients with burns of 20% or more.

These patients are prone to gastric dilation due to paralytic ileus.

Foley catheters are usually placed with genitalia burns in a patient that has a 20% total body surface area.

Pain relief.

Morphine is usually indicated, and we give it IV in small, frequent doses.

IM and sub-Q meds are absorbed irregularly, so you want to try to avoid that if possible.

For a circumferential burn, edema and eschar formation can obstruct venous return and lead to decreased arterial blood flow.

In this case, an escharotomy may be indicated.

We need to do frequent pulse checks on these patients.

Signs of decreasing blood flow include increased pain, numbness, and a change in the quality of their pulse.

Circumferential chest and abdominal burns may restrict ventilation.

We need to assess for the adequacy of chest expansion, rapid, shallow respirations, decreased oxygenation, and an altered mental status.

When we're determining the severity of a burn injury, we need to look at the depth, the extent, the location, and any patient factors such as age.

If the patient is less than two or greater than 60, these patients' skin is much more fragile.

Are there any concurrent medical problems such as diabetes, sickle cell, or heart disease?

And are there any other associated injuries?

When we're determining the depth of the burn, the major determining factor in plan is directly related to the temperature and the length of time that the area was exposed to this hot object.

First-degree burns are considered superficial.

It's the epidermis only.

They're dry, red, painful.

Examples can be a sunburn or flash burn.

First-degree burns are not included in the calculation of the total body surface area.

Comfort measures are typically used to treat these burns.

Superficial first-degree burns may be more serious in an infant, especially if it affects a larger body surface area.

Second-degree burns, such as partial-thickness, can be subdivided into superficial or deep.

This involves the epidermis and the dermis.

These are usually pink, red-- they can be deep cherry-red and mixed with a little bit of white.

There are moist blisters and there is extreme pain, as the nerve endings are exposed.

In third-degree, full-thickness, this involves the epidermis, dermis, and subcutaneous tissue.

They're white, khaki, charred, dry, and leathery to the touch.

They have little to no pain to the area, because the nerve endings are completely destroyed.

When we're determining the extent and the total body surface area of the burn injury, most of you aren't going to have the Lund and Browder chart in your back pocket, so a quick reference can be the palmar method.

The patient's palm is considered 1%, so when you're trying to figure out the total body surface area of a burn, the patient's palm can be considered 1%.

Patients with burns to their eyes, ears, face, hands, perineum, major joints and/or feet should be referred to a burn center.

Airway difficulties and delayed respiratory problems can occur with burns to the face, neck, nose, and mouth.

Hand burns may require close attention to positioning, splinting, and therapy to maintain or restore full function.

Foot and lower leg injuries can interfere with mobility and ADLs, and edema can interfere with healing.

These are all criteria to refer to a burn center.

Special considerations for pediatric burn patients in child abuse.

Approximately 10% to 20% of our pediatric burn injuries are suspected abuse.

The history of the injury and documentation of the findings are key factors and very important when determining mechanism of injury and if these patients were non-accidental traumas or not.

When we're considering if these patients are abused, here are some alerting factors.

There are mirror-image burns of the extremities.

These burns are localized to the perineum, genitalia, and buttocks.

The burns are older than the history.

There is an unexplained delay in seeking treatment.

There are other unrelated issues such as hematomas, lacerations, fingernail marks, or scars.

There's magical injuries-- nobody witnesses it-- or the injury is blamed on a sibling or an injured child.

Now let's discuss the initial wound care.

We're going to discuss the initial wound care by the type of burn.

For a thermal burn, cover with a clean, dry sheet.

There's no ointment needed, and no debridement.

For an inhalation injury, 100% oxygen and early intubation.

For a chemical injury, brush off the dry chemicals and then flush the area.

Remember to protect yourself and attempt to identify the chemical if possible.

For an electrical injury, remember that there's concern for the normal cardiac function, so an EKG may be necessary for at least 24 hours.

Try to identify the entrance and the exit wounds, and remember that these electrical injuries may cause extensive tissue damage that's not visible on the body surface area.

Our wound care for burns by location.

For the face, keep the head of the bed elevated.

Check for an inhalation injury.

Eyes-- flush continuously.

An ophthalmology consult may be necessary.

Ears-- keep the head of the bed elevated.

We do not use silvadene on the ears, as it turns their cartilage to mush.

There are minimal or no dressings needed for the ears.

Hands-- elevate and wrap the fingers separately.

Feet-- elevate and separate their toes.

The genitalia may require a Foley catheter early, and remember to keep the area clean.

In the picture noted, you can see that there is a dressing that covers the patient's entire face.

This is not necessary.

Please just elevate the head of the bed, check for an inhalation injury, and keep the face open to air.

When we're documenting about a burn, remember that our flow-sheet should contain the intake and the output, medications, and any treatment given.

The history of the injury is very important, and document the family situation.

Treatment MUSC Children's Health.

We are the only pediatric burn referral center within the state of South Carolina.

As I mentioned, we have a multidisciplinary burn team that specializes in the care of children and burn treatment.

We offer telemedicine sites through Beaufort Memorial emergency department, Colleton County, Colleton's ED, Conway, Georgetown, and Waccamaw.

MUSC Children's Health and South Carolina Burned Children's Fund have a partnership.

The South Carolina Burned Children's Fund is a non-profit 501(c)3 with fire departments and other businesses throughout the state of South Carolina that collect aluminum cans.

We have received over 175 million cans that have been recycled.

The proceeds are then given to our program.

Other fund-raising events are promoted as well.

The South Carolina Burned Children's Fund assists with transportation, lodging, and meals for families.

It assists with funds for medications, dressings, and garments not covered by insurance.

One of the major things that this fund does is, it hosts a camp-- it's called Camp Can Do-- that's free of charge for severely burn-injured children from the ages of 6 to 17.

Here on this slide, you can see that we have many fire departments throughout the entire state that are collecting cans and supporting our program.

As I mentioned, here are mission statements for the South Carolina Burned Children's Fund.

It's to partner in each burn child's recovery by funding non-medical items and services, and funding patient family basic needs during the treatment.

We also provide burn care and safety education to parents, families, and our community.

The fund also supports our staff in continuing education, such as the advanced burn life support course, and for our burn staff to attend national conferences.

It also allows emotional support for the patients and families, such as Child Life and a school re-entry program.

The mission, also, of the South Carolina Burned Children supports burn awareness and fire prevention activities in the state of South Carolina.

We have a grant for fire prevention and burn awareness that is located within our website, and the grant can be applied for from any department or business.

The grant, in the past, has been used for fire prevention materials, safety brochures, fire safety contests, smoke alarm drives, education for health care providers, and support for a program that you may have in place.

The fund also provides needs that are not covered by insurance, such as protective clothing, and pressure garments, ointments, splints, and supplies.

We had one patient that had walked through hot leaves with his baseball cleats, and his family was unable to purchase another pair of baseball cleats.

The South Carolina Burned Children's Fund gave him a pair of baseball cleats upon his discharge.

And then, as I mentioned, Camp Can Do is a huge fund-raising and support that we do for our pediatric burn patient population.

For more information on our program, you can check us out on Facebook or our website.