Purpose: To provide guidance to practitioners caring for pediatric patients during a disaster.
Disclaimer: This guideline are not meant to be all inclusive, replace an existing policy and procedure at a hospital or substitute for clinical judgment. These guidelines may be modified at the discretion of the healthcare provider.

96 Hour Care Guidelines for Pediatric Burn Patients if Transfer to a Hospital with Burn Capabilities is Not Feasible

Initial Patient Treatment

- Stop the burning process
- Use universal precautions
- Remove all clothing and jewelry
- Prior to initiating care of the patient with wounds, it is critical that health care providers take measures to reduce their own risk of exposure to potentially infectious substances and/or chemical decontamination. Rinse liberally with water, according to protocol, if suspected chemical exposure. Apply clean, dry dressing(s) initially to avoid hypothermia.
- Apply clean DRY sheet or bedding to prevent hypothermia.
- For the care of a burn patient with radiation exposure, see page 21.
- Consult Pediatric Care Medical Specialist (PCMS) and/or the State Burn Coordinating Center (SBCC) for assistance with care of the acutely and critically ill patient, to individualize patient care; if patient does not improve and needs to be transferred; and as needed for further support and consult.
- Palliative care/comfort care patients: During a burn MCI, resources may not be available to treat those with extensive burn injuries. There are sections within the following guidelines that provide guidance to providers in order to address their needs. Consult the SBCC or the Pediatric Care Medical Specialist (PCMS) for additional assistance from palliative care experts.

Primary Assessment, Monitoring, Interventions and Key Points

Assessment and Monitoring	Interventions	Key Points
Airway Maintenance with Cervical Spine Motion Restriction • Assess throat and nares. • Signs of airway injury: ○ Hypoxia ○ Facial burns ○ Carbonaceous sputum ○ Stridor ○ Hoarseness ○ Nasal singe	Airway Maintenance with Cervical Spine Motion Restriction • Chin lift/jaw thrust with C-spine motion restriction as needed. • IMMOBILIZE SPINE as indicated. Position for optimal airway and suction as needed. Position infants and children < 2 yrs supine on a backboard with a recess for the head or use a pad under	Airway Maintenance with Cervical Spine Motion Restriction • Airway edema increases significantly after IV/IO fluids are started. • Stridor or noisy breath sounds indicate impending upper airway obstruction. • Younger children and those with larger burns are more likely to require intubation due to the smaller diameter of the child's airway and the need for significant fluid volumes during resuscitation.

Assessment and Monitoring	Interventions	Key Points
○ History of a closed space fire	the back from the shoulders to the buttocks. • Place an oral pharyngeal airway or cuffed endotracheal tube (ETT) in the unconscious patient • Intubate early with cuffed ETT. • Secure ETT with ties passed around the head; do not use tape on facial burns since it will not adhere to burned tissue. • Insert gastric tube on all intubated patients. • **Palliative care/comfort Care Patients**: Patients triaged as expectant or to receive palliative/comfort care only should not be intubated. Administer oxygen to aid comfort and prevent air hunger. Also consider pain management. See pages 16-17 for more guidelines.	• Prophylactic intubation is preferred because the ensuing edema obliterates landmarks needed for successful intubation. However, during a burn MCI, there is a need to consider resource availability (e.g. number of ventilators, number of trained staff to manage ventilators) ○ It is critical that the ETT is secured well. An ETT that becomes dislodged may be impossible to replace due to the edema of the upper airway.
<u>Breathing and Ventilation</u> • Assess for appropriate rate and depth of respirations with adequate air exchange. • Monitor pulse oximetry while checking carbon monoxide (CO) level (as needed). • If circumferential torso burns, monitor chest expansion closely. • Obtain Arterial Blood Gas (ABG). • Obtain Carboxyhemoglobin (COHb) level if suspected inhalation injury.	<u>Breathing and Ventilation</u> • 100%, high flow oxygen using a non-rebreather mask or ETT; wean as appropriate. • Mechanically ventilate as needed. Ventilator settings are not different for burn patients compared to other patients. • Elevate head of bed (HOB) if not contraindicated to decrease facial edema. • Consult with SBCC to determine if escharotomy is indicated and to receive guidance on performing an escharotomy.	<u>Breathing and Ventilation</u> • CO levels decrease by half (½) every 40 minutes while on 100% FiO_2. CO level goal is <10%. • An escharotomy is an incision performed longitudinally through burned tissue down to subcutaneous tissue over the entire involved area of full thickness circumferential (or nearly circumferential burn) that is causing constriction and loss of peripheral perfusion or airway constriction. A chest escharotomy may be indicated in circumferential or full thickness chest burns due to location or depth of burn in the trunk area, which may interfere with ventilation.
<u>Circulation with Hemorrhage Control</u> • Continuous cardiac monitoring as needed.	<u>Circulation with Hemorrhage Control</u> • Two large bore peripheral IVs in non-burned extremities (secure well).	<u>Circulation with Hemorrhage Control</u> • Cardiac monitoring may be needed if there is an electrical injury, concurrent trauma or cardiac issues

Assessment and Monitoring	Interventions	Key Points
• Control any signs of hemorrhage.	• If unable to secure peripheral IV in non-burned extremity, burned extremity can be used if necessary; suture IV in place. • If unable to establish a peripheral IV, place an intraosseus (IO). IO access can be through burned skin. • Initial IVF with Lactated Ringers (LR) ○ ≤ 5 yrs. 125 mL LR/hour ○ 6-13 yrs. 250 mL LR/hour ○ ≥ 14 yrs. 500 mL LR/hour	• Dysrhythmias may be the result of an electrical injury • To secure an IV on burned skin (tape will not stick), consider suturing in place or using self-adhesive (e.g. Coban) or other type of wrap. Self-adhesive or other wraps should be applied loosely to prevent skin breakdown. • **Palliative care/Comfort care patients:** IVs should be started for the administration of medications for pain and anxiety. Do not administer large volumes of fluid. Excessive fluid will result in decreased circulation and increased pain due to edema.
<u>Disability</u> • Neurologic checks every 4 hours and PRN. ○ Determine level of consciousness. ○ Obtain Glasgow Coma Scale ○ Consider using "AVPU." ▪ A: Alert ▪ V: Responds to verbal stimuli ▪ P: Responds to painful stimuli ▪ U: Unresponsive • Obtain glucose level	<u>Disability</u> • Treat cause of altered mental status as indicated: ○ Hypoglycemia: ▪ Dose: Dextrose 0.5-1 g/kg IV/IO • Birth- 28 days: D10W: 2 mL/kg IV • Infants > 28 days- 1 y/o: D12.5%W: 5-10 mL/kg IV/IO • 1 y/o-8 y/o: D25W: 2-4 mL/kg IV/IO • > 8 y/o: D50W: 1-2 mL/kg IV/IO	<u>Disability</u> • If altered neurological status, consider the following: ○ Associated injuries ○ CO poisoning ○ Substance abuse ○ Hypoxia ○ Hypoglycemia (<60 mg/dL in infants/children; <50 mg/dL in neonates) ○ Pre-existing medical condition
<u>Exposure</u> • Monitor temperature	<u>Exposure</u> • Remove all clothing and jewelry. • Initially place a clean, dry sheet over the wounds until a thorough cleaning is done. • Keep patient and environment warm. ○ Keep patient covered ○ Cover the patient's head	<u>Exposure</u> • Localized hypothermia causes vasoconstriction to damaged area reducing blood flow and tissue oxygenation and may deepen the injury. Systemic hypothermia (core temp less than 95° F / 35° C) induces peripheral vasoconstriction that may increase the depth

Assessment and Monitoring	Interventions	Key Points
	○ Warm the room ○ Warm the IV/IO fluids ○ External patient warming devices	of the burn and interfere with clotting mechanisms and respiration in addition, to causing cardiac arrhythmias. • Use portable radiant heaters with caution

Secondary Assessment, Monitoring, Interventions and Key Points

Assessment and Monitoring	Interventions and Key Points
History • Obtain circumstances of injury • Obtain medical history. Consider using "AMPLET." ○ Allergies, Medications, Previous illness/history, Last meal/fluid intake, Events related to injury, Tetanus and childhood vaccinations	History • Obtain history from patient early before intubation if possible. Obtain contact information for family as well.
Complete Physical Exam • Head to toe exam • Vital signs: Perform as indicated in health care facility policy. May need to perform more frequently if patient is unstable. ○ Heart rate (HR) ○ Blood pressure (BP) ○ Respiratory rate (RR) ○ Temperature ○ Pulse oximetry ○ Capillary refill ○ Skin color of unburned skin ○ Imperative to obtain weight on patient ▪ If possible obtain weight before initiating IVF resuscitation • Determine extent/size of burn by calculating the TBSA using: ○ Rule of Nines or Rule of the Palm (See page 19 for printable version) ○ Lund-Browder chart (See page 18 for printable version) • Determine the depth of the burn (See page 17 for more information)	Complete Physical Exam • Due to increased catecholamines and hypermetabolism associated with burn injures, the HR will be increased. Relative tachycardia is normal for burn patients (will vary based on the age of the patient). Sustained tachycardia may indicate hypovolemia, inadequate oxygenation, unrelieved pain or anxiety. • May need to use doppler to obtain blood pressure • Oral rehydration can be used in the following pediatric patients: ○ Patients not intubated. ○ Injury not an electrical injury. ○ Awake and alert with < 10% TBSA. ○ Contact the SBCC for assistance with oral rehydration. ○ Monitor quality and quantity of urine output on patient's receiving oral rehydration. • IV/IO fluid burn resuscitation-Use Lactated Ringers: ○ When supplies of LR are depleted, 0.9 NS and 0.45 NS or colloids can be used for fluid resuscitation. Do not use fluid containing glucose for fluid resuscitation. ○ 3 mL x wt (kg) x % TBSA = total for first 24 hours post burn. ○ Administer half of the above amount in first 8 hours post burn.

Assessment and Monitoring	Interventions and Key Points
○ *Superficial (1st degree)* ▪ Involves the epidermis, ▪ Appearance: Red (e.g., sunburn) ▪ Do not include when calculating % TBSA, ○ *Partial thickness (2nd degree)* ▪ Involves the entire epidermis and a variable portion of the dermis ▪ Appearance: red, blistered and edematous. ○ *Full thickness (3rd degree)* ▪ Involves the destruction of the entire epidermis and dermis ▪ Appearance: white, brown, dry, leathery with possible coagulated vessels • If camera is available, take pictures of initial burn injuries to document progression of burn injury. • Labs on admission and every day as indicated by medical condition: ○ Electrolyte panel ○ Complete blood count (CBC) ○ ECG for electrical injury or cardiac history ○ ABG with COHb ○ Cardiac panel for electrical injury • CXR if intubated, inhalation injury suspected or underlying pulmonary condition. • Monitor glucose at least every 2 hours x 24 hours. • Monitor for the following signs and symptoms in full thickness, circumferential burn injuries which may indicate a circulation deficit and possible need for escharotomy: (6 P's) ○ Pallor or cyanosis of distal unburned skin on a limb ○ Pain ○ Pulselessness ○ Paralysis ○ Paresthesia	○ Administer remaining amount over next 16 hours post burn. • Pediatrics < 10 kg: Due to limited glycogen stores, in addition to resuscitation IV/IO fluids, administer D5% LR at maintenance rate: ○ To calculate maintenance IVF rate for children: ▪ 4 mL/kg/hr for 1st 10 kg + 2 mL/kg/hr for 2nd 10kg + 1 mL/kg/hr for each additional kg over 20kg = IV/IO fluid maintenance rate • The above calculation is a starting point for fluid resuscitation. IVF rate should be titrated to maintain urine output. ○ Pediatrics <30 kg: 1 mL/kg ○ Pediatrics >30 kg: 0.5 mL/kg • Tetanus prophylaxis, unless received within last 5 years. • Place a soft feeding tube for all intubated patients. Feedings should be initiated within 6 hours of injury. • The goal in the early stages of burn resuscitation should be to maintain the individual's pre-event BP. • If signs of circulation deficit are present, contact the SBCC. • Eyes: ○ Remove contact lens prior to eyelid swelling if facial involvement. ○ Fluorescein should be used to identify corneal injury. ○ If eye involvement or facial burns consider, consulting an ophthalmologist. • Consult with SBCC to determine if escharotomy is indicated and to receive guidance on performing an escharotomy. • Finger escharotomies are rarely indicated.

Assessment and Monitoring	Interventions and Key Points
○ Poikilothermia ○ Inability to ventilate in patients with deep circumferential burns of the chest	
<u>Comfort</u> • Frequent pain/sedation assessment ○ A minimum of every 4 hours ○ Before and after pain/sedation medication given • Use age appropriate pain scales for pediatric patients (e.g., Wong Baker FACES, FLACC)	<u>Comfort</u> • Emotional support and education is essential. • IV/IO analgesia is preferred route during initial post injury period. • Large amounts of IV/IO analgesic may be required to attain initial pain control. ○ Administer opioids in frequent (every 5 minutes) small to moderate doses until pain is controlled. ▪ Morphine 0.1-0.2 mg/kg IV/IO (max 10mg/dose) ▪ Fentanyl 1-2 mcg/kg/dose IV/IO/IN (not to exceed maximum adult dose) ○ Hydrocodone/acetaminophen 0.1-.02 mg/kg PO/NO/OG every 4-6 hours ○ Acetaminophen-codeine (Tylenol #3) 0.5-1mg/kg/dose PO/NG/OG every 4-6 hours (NOTE: Not recommended in children < 2 y/o) • Consider use of non-pharmacological techniques. ○ Examples: ▪ < 2 y/o: distraction ▪ 2-6 y/o: distraction, deep breathing ▪ > 6 y/o: deep breathing, distraction, imagery • Consider anti-anxiety medication in addition to pain medication. ○ Lorazepam (Ativan) PO/IV/IO ○ Midazolam (Versed) IV/IO/IN • Consider sedation for procedures and, if intubated: ○ Ketamine ○ Lorazepam (Ativan®) ○ Midazolam (Versed®) ○ Dexmedetomidine (Precedex®)
<u>Wound Care</u>	<u>Wound Care</u> • Pre-medicate patients for pain and anxiety before wound care.

Assessment and Monitoring	Interventions and Key Points

• Maintain temperature of patient since they are prone to hypothermia
• Assess the wound and monitor for:
  ○ Change in wound appearance
  ○ Change in size of wound
  ○ Signs or symptoms of infection
• Describe what you see:
  ○ Color (e.g. white, leathery, or pink, moist)
  ○ Sensation (distinguish between pain and sensation)
  ○ Temperature
  ○ Swelling
  ○ Cellulitis (redness around the wound)
  ○ Odor (foul smelling, sweet smelling, etc.)
  ○ Drainage (amount, type)
• Compartment syndrome
  ○ Can have in non-burned limbs and abdomen
• Check of the circulation of an extremity before and after wound care
	• In a mass casualty disaster situation wound care for patient with a >20% TBSA burn can be performed once per day.
	• Contraindications for silver sulfadiazine (Silvadene):
	  ○ Patient's with a sulfa allergy
	  ○ During pregnancy
	Instead use another topical or wound coverage product.
	• Wash wounds with soap and warm tap water using a wash cloth.
	  ○ Remove water by patting dry
	• Shave daily for burned scalps and faces.
	• Perform wound care every day if using:
	  ○ Silver sulfadiazine (Silvadene) cream
	  ○ Bacitracin
	• Debride ALL blisters except for:
	  ○ Intact blisters on hands and feet unless it is impeding range of motion to the joints,
	  ○ Weeping blister(s).
	• Ear wound care:
	  ○ Ears are poorly vascularized and at risk for chondritis.
	• How to apply silver sulfadiazine (Silvadene) cream:
	  ○ Apply thin layer enough so that the wound cannot be seen through the cream.
	  ○ The layer of silver sulfadiazine (Silvadene) should be thick enough to prevent the wound from drying out prior to the next dressing change.
	  ○ Cover with a dressing; the purpose of a dressing is to keep the cream from rubbing off before the next dressing change.
	• How to apply silver impregnated antimicrobial dressings (e.g., Acticoat^{R}, Mepilex):
	  ○ Apply a single layer of the dressing moistened with water over burn wounds so that all areas are covered.
	  ○ Water should be used to keep the dressing and overlying gauze moist to maintain the dressing's antimicrobial activity. (*DO NOT use saline because it deactivates the silver's antimicrobial ability)*.

Assessment and Monitoring	Interventions and Key Points
	○ Should be held in place with water-moistened gauze dressing. ○ Dressing does not need to be changed for 7 days. ○ The overlying gauze can be changed as necessary. ○ If signs of infection appear, remove dressing to assess wound. ○ Record the date of the application. • Wrap fingers separately if burned. • Place silver sulfadiazine (Silvadene) coated gauze between the toes. • For extensive and severe burns to the face: ○ Apply a double antibiotic ointment around the eyes and mouth to avoid cream from draining into them. ○ Can use ophthalmic ointment around eyes. ○ Silver sulfadiazine (Silvadene) can be used on the face • For moderate facial burns, Bacitracin or other antibiotic ointment can be used without a dressing. • Genital/Perineal Burns ○ Urinary catheter may be indicated for genitalia or perineal burns. Evaluate each patient individually to determine if needed. ○ Apply lubricated gauze to labia and in the foreskin to prevent adhesions and decrease risk of infection in this area of high contamination. • Elevate burned extremities above the level of the heart.

Ongoing Assessment, Monitoring, Interventions and Key Points

Assessment and Monitoring	Interventions
Airway and Breathing • Obtain chest X-ray if intubated, inhalation injury suspected or underlying pulmonary condition. • Chest X-ray will usually be clear on admit. If inhalation injury is present, the X-ray will show infiltrates around the second day correlating with a deteriorating oxygen status. • Frequent suctioning is necessary to prevent occlusion of the airway and endotracheal tube. Anyone with an inhalation	Airway and Breathing • Supportive therapy and O_2; wean as appropriate. • HOB should be elevated 30 degrees to minimize facial and airway edema, unless contraindicated. ○ Use reverse Trendelenburg for patients with C-spine motion restriction requirements. • Suction airway frequently.

Assessment and Monitoring	Interventions
injury is subject to increased respiratory secretions and may have a large amount of carbonaceous debris in the respiratory tract. • Airway edema peaks at 36 hours post burn • Weaning from the ventilator and extubation: ○ CO level should be normalized (< 10%) for at least 6 hours ○ There is an Increased risk of needing to re-intubate inhalation injury patients so maintain intubation equipment at bedside after extubation ○ Don't extubate patient unless there is a leak around the ETT cuff	• **Inhalation Injuries:** ○ Treatment for inhalation injury is supportive care and includes: ▪ Intubation as indicated ▪ Provide adequate sedation to prevent dislodgement of ETT ▪ Frequent suctioning ▪ Positive End Expiratory Pressure (PEEP) may improve ventilation ○ Secure ETT with ties instead of tape since tape will not adhere to burned tissue ○ Mark ETT at fixed position (teeth or gums not lips which may have swelling)
Circulation/Outputs of Resuscitation • Monitor mean arterial blood pressure (MAP): ○ Goal for MAP is > 60 mmHg • Monitor hourly urine output: ○ Goal: 1 mL/kg/hr for children < 30 kg • Monitor for myoglobin/pigment in urine (burgundy color). • Additional resuscitation fluid needs can occur with: ○ Very deep burns ○ Inhalation injury ○ Associated injuries ○ Electrical injury ○ Delayed resuscitation ○ Prior dehydration ○ Alcohol or drug dependence ○ Small children • Children and patients with preexisting cardiac disease are particularly sensitive to fluid management. • Diuretics are not indicated in myoglobin in the urine. • Monitor glucose at least every 2 hrs x 24 hours.	Outputs of Resuscitation • Insert arterial line. • Insert urinary catheter. • If urine output is < goal, ↑ fluids by 1/3. ○ Example: u/o for 20 kg pediatric patient = 10 mL/hr, fluid rate at 50 mL/hr, ↑ to 66 mL/hr • If urine output is > goal, ↓rate of infusion by 1/3. ○ Example: u/o for 20 kg pediatric patient = 30 mL/hr fluid rate at 50 mL/hr, ↓to 33 mL/hr • Upon completion of the resuscitation phase (typically 24 hrs post burn), ↓ hourly fluid volume by 10% per hour to a maintenance fluid with D5 0.45 NS with 20 mEq KCL/L. ○ Check serum sodium and potassium on day 2 post burn • Myoglobin in urine: ○ Maintain urine output: ▪ 2 mL/kg/hr ○ Increase fluid rate (LR). • Oliguria or anuria requires mostly due to inadequate fluid resuscitation and requires more rapid fluid administration. **Diuretics are contraindicated**!

Assessment and Monitoring	Interventions

• May take > 24 hours to see signs of adequate resuscitation:
  ○ Normalization of blood pH
  ○ Improved peripheral circulation
  ○ Clearing sensorium (more alert)
  ○ Stable BP
• If IVF requirements are still high after 24 hours of crystalloids, contact the SBCC for medical consultation.
	• Treatments for hypotension:
	  ○ Albumin human 5% injection (consult SBCC before using)
	  ○ Vasopressors initiated when MAP is low despite adequate fluid resuscitation
	  ▪ Use institution specific dosing ranges

<u>Circulation</u>
• Perform pulse checks (CMS) every 1 hour if there are circumferential burns on extremities.
  ○ Monitor pulses by palpation or doppler exam.
  ▪ Decreased sensation
  ▪ Severe unrelenting deep tissue pain
  ▪ Diminished distal pulses
  ▪ Capillary refill > 5 sec
• After 24-48 hrs decrease frequency of pulse checks to every 2 hours if stable.
• Assess bowel sounds to monitor for ileus.
	<u>Circulation</u>
	• Elevate burned extremities on pillows or blankets to improve circulation and minimize edema.
	• Circumferential chest injuries may become life threatening; an escharotomy may be necessary.
	• Verify that pulselessness is not due to profound hypotension.
	• Scrotal swelling, though often significant, does not require specific treatment.

<u>Body Temperature</u> Perform temperature checks based on health care facility protocol. • If unstable or significant burn, hourly vital signs may be indicated.	<u>Body Temperature</u> • With 2nd and 3rd degree burns, patients may have difficulty regulating their temperature; monitor for hypo and hyperthermia. • Keep patient normo-thermic, especially during wound care. • Keep patient covered. When supplies of blankets are depleted, patients can be wrapped in plastic wrap or aluminum foil for insulation and warmth. • Warm the room. • Warm IV/IO fluid if possible, especially if patient is very hypothermic.
<u>Other Pharmaceutical Considerations</u>	

• Stress ulcer prophylaxis
  ○ Begin feedings within 6 hours of injury
  ○ Start on prophylaxis medications if intubated (based on institutional preference, hospital formulary and availability
• Anti-emetics	

<table>
<tr><th>Assessment and Monitoring</th><th>Interventions</th></tr>
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Use cautiously (enteral feeding intolerance can be a sign of sepsis in burn patients)
Ondansetron (Zofran®)

Itching

Diphenhydramine (Benadryl®)
Hydroxyxine (Atarax®)

Vitamin Supplements

Start vitamins after feedings (via tube or PO) are initiated
Multivitamins
Ascorbic acid
Zinc sulfate
Glutamine (if available and on formulary)

Venous thromboembolism prophylaxis

<u>Consult SBCC/pediatric experts before starting</u>

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<tr><td>
<u>Nutrition</u>

Obtain dry weight on admission.
Nutritional plan should start < 6 hours post injury
Increased need for protein, calories, vitamins and minerals for wound healing
Adequate intake is more important than route of intake
TPN is rarely used. Oral feedings (via tube or PO) provides most benefit for burn patients.
Indications for feeding tube:

Intubated
>20% TBSA
Unable to maintain caloric needs via PO

Indications for post pyloric feeding tube:

Conscious sedation
Twice daily wound care
Frequent operative interventions
Intolerance of gastric feeding (nausea, vomiting, increased gastric residuals)

</td><td>
<u>Nutrition</u>

Consult hospital dietitian to adjust nutritional plan based on lab result trends (CRP, Prealbumin, albumin & transferrin)
Conduct daily calorie counts
Daily calorie needs based on % TBSA, weight and age

Consult SBCC and pediatric experts for calculations

Increased protein needs.

20 % of calories should be from protein (approximately 2.5 - 4.0 grams protein/kg)

Regular high calorie, high protein diet if able to take PO.

If unable to maintain adequate caloric requirements, initiate tube feedings.

No free water drinks (plain water) if taking PO, only high calorie liquids.
Ensure stool softeners are ordered to prevent constipation due to pain medications.
Begin enteral nutrition as soon as possible.
Soft feeding tubes are preferred over hard salem sump nasogastric tube.
Titrating patient off tube feedings to PO

Switch to night feedings first
If eating during the day and taking in enough calories, can progress to PO feedings only

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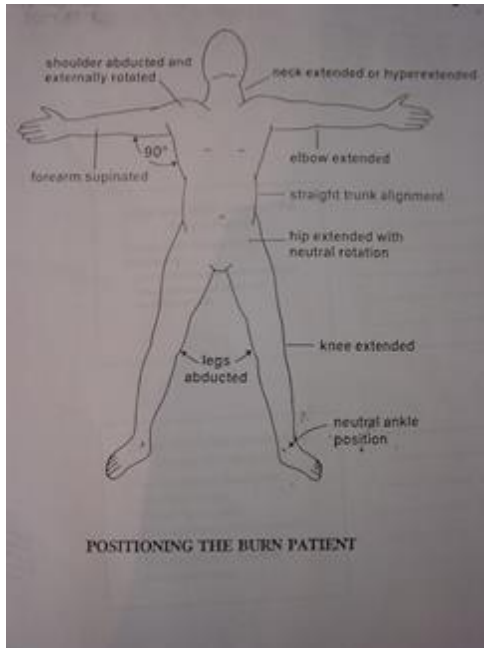
<tr><th>Assessment and Monitoring</th><th>Interventions</th></tr>
<tr><td>• See Nutritional Algorithm for Pediatric Burn Patients on page 25 for initial infusion rates, titrating feeding rates and residual check</td><td>○ Titrating might be done in acute rehab setting and not in hospital setting</td></tr>
<tr><td colspan="2"><u>Infection Control</u>
• Utilize universal precautions.
• If wounds are exposed:
○ Apply gown, mask and gloves to protect patient.
• No systemic antibiotics are required for the burn injuries.</td></tr>
<tr><td><u>Splinting, Positioning and Mobility</u>
• In a disaster, physical and occupational therapists may splint patients in functional positions and help with dressings.
• Rehabilitation (splinting, positioning and mobility) should be initiated early on in care of patient
• Check circulation status of extremities before and after positioning and splinting
• Monitor for pressure areas under splints</td><td><u>Splinting, Positioning and Mobility</u>
• Obtain physical therapy /occupational therapy consult.
• Early mobilization of patients
• HOB elevated at all times.
• Elevate burned extremities above the level of the heart.
• Positioning:
○ Degree of functioning preserved depends on early intervention and prevention of further tissue damage
○ Designed to:
▪ Minimize edema formation
▪ Prevent tissue destruction
▪ Maintain soft tissue in an elongated state to facilitate optimal functional recovery
• Use whatever tools are available to assist (e.g., pillows, towels, splints, bedside tables, wedges).
• Neck burns
○ Maintain the head in a neutral position.
○ No pillows or blankets under the head flexing the neck forward.
• Axilla burns
○ Keep arms extended to decrease contractures.
• Ear burns
○ No external pressure should be applied.
○ No pillows or blankets under the head.
• Out of bed (OOB) - If legs are burned, apply ace wraps when OOB.</td></tr>
</table>

Assessment and Monitoring	Interventions

	• Encourage active range of motion hourly when awake.
	• Encourage activities of daily living.
	• Splinting:
	  ○ Use either ace/elastic wraps, gauze rolls/wraps, strappings with post-mold material (e.g., thermoplastic-perforated), or whatever is available
	  ○ Wearing schedule:
	  ▪ 24 hours/day except for dressing changes and range of motion exercises
	  ▪ At night only for compliant patients who are able to perform exercises independently
	  ▪ Post wearing schedule at patient's bedside

Proper Positioning of a Burn Patient



Area Involved	Contracture Predisposition	Contracture Preventing Position
Anterior neck	Flexion	Extension, no pillows
Anterior axilla	Shoulder adduction	90° abduction, neutral rotation
Posterior axilla	Shoulder extension	Shoulder flexion
Elbow/Forearm	Flexion/pronation	Elbows extended, forearm supinated
Wrists	Flexion	15°–20° extension
Hands:		
MCPs	Hyperextension	70°–90° flexion
IPs	Flexion	full-extension
Palmar Burn	Finger flexion, thumb opposition	All joints full extension, thumb radially abducted
Chest	Lateral/anterior flexion	Straight, no lateral or anterior flexion
Hips	Flexion, adduction, external rotation	Extension, 10° abduction, neutral rotation
Knees	Flexion	Extension
Ankles	Plantar flexion	90° dorsiflexion

Reunification

Assessment and Monitoring	Interventions
During a large scale disaster, family members may become separated. It is crucial that staff attempt to reunify patients with their family. Children are more vulnerable to maltreatment, abuse and abduction, if separated from their care giver. Community partners, such as the American Red Cross and National Center for Missing and Exploited Children, can assist with this process. The reunification process begins with EMS at the scene and, if possible, trying to keep known family members together when making transport decision. The Patient Identification Tracking Form (Attachment 12 in Burn Surge Annex) should be utilized for all patients to assist with the reunification process.	

Psychosocial
• Address the psycho-social needs of burn patients
  ○ Immediate needs (pain, fear of unknown, similar to any trauma patient)
  ○ Long term needs (more ongoing, can need support for years)
• Treatment therapies may trigger traumatic response
• Explain any procedures.
• Involve patient and family.
• Consider social worker consultation.
• Offer spiritual care.
• Consult child life specialists, if available.
• Child's needs and understanding of the injury and care will vary based on their developmental level.
  ○ Infants
  ▪ Learn through sensory stimulation (especially touch) and movement.
  ▪ Can experience separation anxiety from family/care taker.
  ○ Toddler/Preschool
  ▪ May see the burn injury as punishment for being "bad" so at risk for ineffective coping.
  ▪ Routine is important so coordinate procedures around daily routines.
  ○ School age
  ▪ Anxiety can be decreased by providing child education about processes and involving child in care.
  ○ Adolescent
  ▪ Body image is significant concern.	

Palliative Care/Comfort Care During disasters, patients with extensive burn injuries may be triaged as Expectant based on the Burn Triage Guidelines. Patient's triaged as Expectant still need palliative care/comfort care provided. See the following page for additional information	

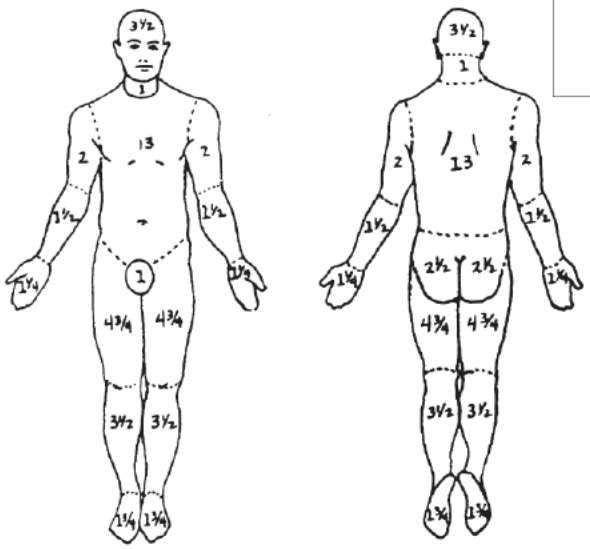
PALLIATIVE CARE COMPONENTS DURING DISASTER MANAGEMENT	
PATHWAY COMPONENT	**CONSIDERATIONS**
Assess the situation	Health of the patient Family dynamic if present
Identify key players	Patient needs Family and friends needs Physician needs Nurses needs
Consider the big picture of the key players	Staff Concerns and any distress of key players Psychological Symptoms of any key players Distress Physical Symptoms of the patient Pain Dyspnea Existential and Spiritual Symptoms of any key players Examples: o Last rites from a priest with Catholic backgrounds o Imam being available for Islamic backgrounds o Hindu and Buddhists have their own beliefs and requests at the end of life. Some request the patient being put on the floor; can be accommodated by lowering the bed all the way to the floor. Legal and Ethical Aspects of Care Any member of the key players uncomfortable with end of life pathways Cultural Aspects of Care Examples: o Family requests for positioning of patient o Turning the bed toward specific directions if requested o Having LED candles available if family requests candles around the body End of Life Logistics Find a location that is accessible for family and friends
Communication	Set expectations and maintain communication
Develop and implement plan	Develop Plan/Manage Death: Implement postmortem logistics Pronouncing death Bereavement Staff debriefing/support
Manage pain, dyspnea, and agitation at the end of life	Family and nursing input is essential Don't forget that using opioids with the intent to control symptoms at the end of life is ethically appropriate Assess: • Distress • Pain: grimace, tachycardia, verbal cues • Agitation: writhing, sweating • Dyspnea: retractions, flaring, tachypnea Un-intubated patients: • Pain or dyspnea: Intermittent IV dosing preferred: Morphine and hydromorphone preferred o Reassess every 10 minute; repeat dose if needed Agitation: Benzodiazepines preferred: Lorazepam and haloperidol preferred Intubated patients: • Pain: Continuous IV infusions preferred: Morphine, fentanyl, and hydromorphone preferred • Agitation: Continuous IV infusions preferred: Midazolam and lorazepam preferred • Increase the dosing every ten minutes • If distress is present, bolus the mediation by one hour equivalent and increase infusion by 25 to 100%. Write orders allowing for titration

Assess Degree of Injury

	APPEARANCE	SURFACE	SENSATION	TIME TO HEALING
1st degree/superficial	Pink or red	Dry	Painful	4-5 days
2nd degree/superficial partial thickness	Pink, clear blisters	Moist, weeping	Painful	14–21 days
2nd degree/deep partial thickness	Pink, hemorrhagic blisters, red	Moist	Painful	Weeks, may progress to 3rd degree and require graft, may lead to contractures
3rd degree/full thickness	White, brown, charred	Dry, waxy, leathery	Painless	Requires excision, high risk for infection/fluid loss
4th degree (tendon, nerve, muscle, bone and/or deep fascia involvement)	Brown, charred	Dry	Painless	Requires excision, high risk for infection/fluid loss

Lund & Browder Chart

BURN DIAGRAM, ESTIMATE
(Lund & Browder)

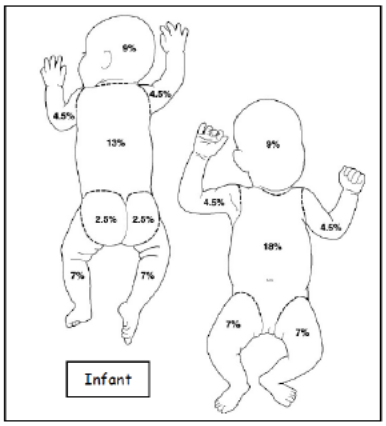


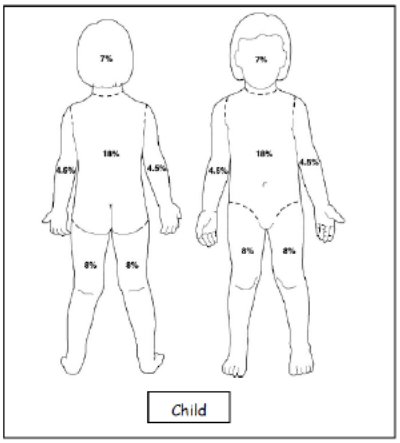
	AGE						BURN ASSESSMENT	
AREA	**infant**	**1-4**	**5-9**	**10-14**	**15**	**adult**	PARTIAL THICKNESS	FULL THICKNESS
head	19	17	13	11	9	7		
neck	2	2	2	2	2	2		
ant. trunk	13	13	13	13	13	13		
post. trunk	13	13	13	13	13	13		
r. buttock	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2		
l. buttock	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2		
genitalia	1	1	1	1	1	1		
r. u. arm	4	4	4	4	4	4		
l. u. arm	4	4	4	4	4	4		
r. l. arm	3	3	3	3	3	3		
l. l. arm	3	3	3	3	3	3		
r. hand	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2		
l. hand	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2		
r. thigh	5 1/2	6 1/2	8	8 1/2	9	9 1/2		
l. thigh	5 1/2	6 1/2	8	8 1/2	9	9 1/2		
r. leg	5	5	5 1/2	6	6 1/2	7		
l. leg	5	5	5 1/2	6	6 1/2	7		
r. foot	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2		
l. foot	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2		
						TOTAL:		

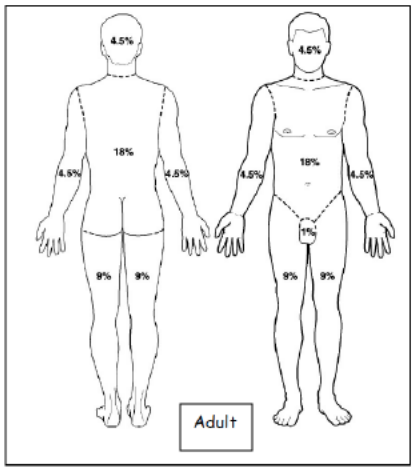
BURN ASSESSMENT: Date _____ Time _____ Signature _____

Rule of 9's Charts:

BURN DIAGRAM ESTIMATE
(Rule of 9's: Estimate of TBSA – Total Burn Surface Area)







Area	Infant	Child	Adult	Burn Assessment	
				Partial thickness	Full thickness
Head	18	14	9		
Chest (Ant. torso)	18	18	18		
Back (Post. Torso) & buttocks	13 (back) 5 (buttocks)	18	18		
Rt. arm & hand	9	9	9		
Lt. arm & hand	9	9	9		
Rt. Leg & foot (anterior)	7	8	9		
Lt. Leg & foot (anterior)	7	8	9		
Rt. Leg & foot (anterior)	7	8	9		
Rt. Leg & foot (anterior)	7	8	9		
Perineum	(include with chest)	(include with chest)	1		

Bolded areas = nine or multiple of nine

Burn Assessment Date_____ Time _____ Signature_____

MANAGEMENT OF BURN PATIENTS WITH RADIATION EXPOSURE

Initial Management of All Pediatric Patients Involved in Radiological Event

- Determine if decontamination is needed due to external contamination (See below and pages 107 and 110 for information specific to decon)
- Stabilize ABCs (Airway, Breathing, Circulation)
- Immobilize spine as indicated
- Perform history and physical exam
- Look for other injuries (trauma)
- Keep patient NPO (including pacifiers)
- Follow your own hospital radiological response policy, if applicable.
- Consult the SBCC and the Pediatric Care Medical Specialist for assistance with care of the acutely and critically ill patient, to individualize the care of patient, if patient does not improve and needs to be transferred and as needed for further support and consult.
- Contact the IEMA Communication Center (1-217-782-7860 OR 1-800-782-7860) to report that any type of radiologic event has occurred and/or report that patients arriving at the hospital have been involved in any type of radiologic incident.
- It is recommended that hospitals consult REAC/TS (Radiation Emergency Assistance Center/Training Site) for questions regarding additional care management information (24 hour emergency phone number: 865-576-1005)

Steps for Decontaminating Externally Contaminated Pediatric Patients

- Admit to controlled area
- Remove clothing (cut clothing in direction away from patient's airway and roll it outward away from patient's skin, trapping any material inside the clothes)
- Place all clothing in plastic bags for testing

↓

- ***Assess for and stabilize any emergent medical issues***
- Obtain medical/event history if patient or family able to provide
- Identify/contain contaminate
- Minimize any additional possible intake
- Follow IEMA, REAC/TS, and/or Department of Nuclear Safety recommendations
- See next page for general Information about Radiological Decontamination

↓

Decontamination Order Priority:
1. Wounds
2. Body Orifices
3. Intact skin

↓

Reassess all areas after decon

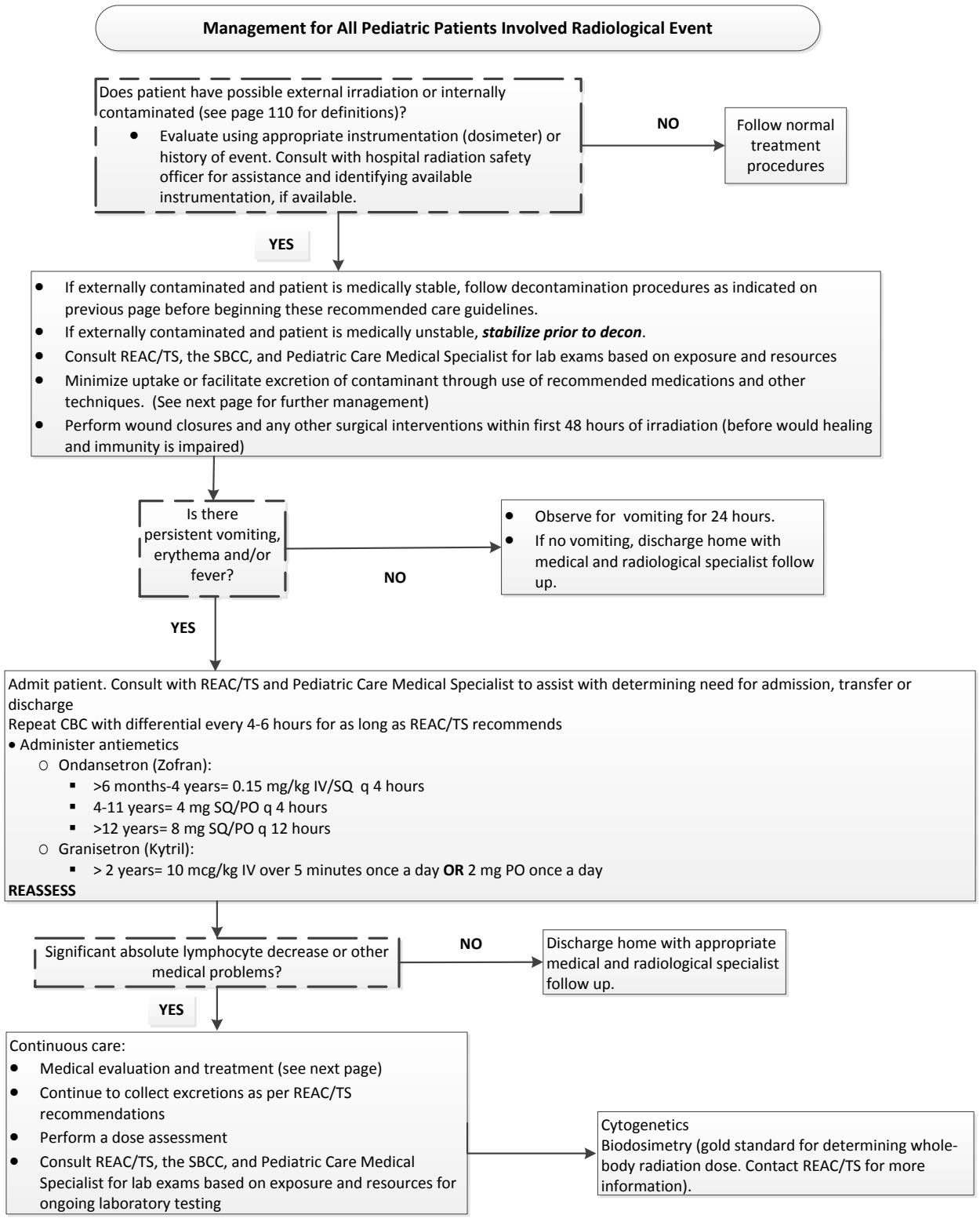
↓

Contamination reduced to acceptable levels?

NO → Decontamination Order Priority

YES ↓

Begin medical treatment (see next page)


Management for All Pediatric Patients Involved Radiological Event
Does patient have possible external irradiation or internally contaminated (see page 110 for definitions)?
Evaluate using appropriate instrumentation (dosimeter) or history of event. Consult with hospital radiation safety officer for assistance and identifying available instrumentation, if available.
NO
Follow normal treatment procedures
YES
If externally contaminated and patient is medically stable, follow decontamination procedures as indicated on previous page before beginning these recommended care guidelines.
If externally contaminated and patient is medically unstable, stabilize prior to decon.
Consult REAC/TS, the SBCC, and Pediatric Care Medical Specialist for lab exams based on exposure and resources
Minimize uptake or facilitate excretion of contaminant through use of recommended medications and other techniques. (See next page for further management)
Perform wound closures and any other surgical interventions within first 48 hours of irradiation (before would healing and immunity is impaired)
Is there persistent vomiting, erythema and/or fever?
NO
Observe for vomiting for 24 hours.
If no vomiting, discharge home with medical and radiological specialist follow up.
YES
Admit patient. Consult with REAC/TS and Pediatric Care Medical Specialist to assist with determining need for admission, transfer or discharge
Repeat CBC with differential every 4-6 hours for as long as REAC/TS recommends
Administer antiemetics
Ondansetron (Zofran):
>6 months-4 years= 0.15 mg/kg IV/SQ q 4 hours
4-11 years= 4 mg SQ/PO q 4 hours
>12 years= 8 mg SQ/PO q 12 hours
Granisetron (Kytril):
> 2 years= 10 mcg/kg IV over 5 minutes once a day OR 2 mg PO once a day
REASSESS
Significant absolute lymphocyte decrease or other medical problems?
NO
Discharge home with appropriate medical and radiological specialist follow up.
YES
Continuous care:
Medical evaluation and treatment (see next page)
Continue to collect excretions as per REAC/TS recommendations
Perform a dose assessment
Consult REAC/TS, the SBCC, and Pediatric Care Medical Specialist for lab exams based on exposure and resources for ongoing laboratory testing
Cytogenetics
Biodosimetry (gold standard for determining whole-body radiation dose. Contact REAC/TS for more information).

Medical Management (Continued)

Medical management is dependent upon the type of specific isotope and the amount of exposure so identifying agent as quickly as possible is important.
Several categories of medical management for internal contamination:

1. Reduction and/or inhibition of absorption of isotope in the GI tract
2. Blocking uptake to the organ of interest
3. Isotope dilution
4. Altering the chemistry of the substance
5. Displacing the isotope from receptors
6. Traditional chelation techniques
7. Early excision of radionuclides from wounds to minimize absorption
8. Bronchoalveolar lavage for severe cases of insoluble inhaled particles

Extensive information for medical management of patients with radiation exposure can be obtain by contacting REAC/TS or in *The Medical Aspects of Radiation Incidents*, which can be found on REAC/TS website at www.orise.orau.gov/reacts

Safety and effectiveness of many of the therapy recommendations have not been established in the pediatric patient. Contact Pediatric Care Medical Specialist and/or REAC/TS representative for treatment recommendations.

The following medications (potassium iodide and Prussian blue) can be obtain through the Strategic National Stockpile (SNS). Hospitals should follow their existing policy to request medications from the SNS. For questions or concerns regarding the policy to request medication from the SNS, hospitals can contact their local health departments, Regional Hospital Coordinating Center (RHCC) or the Pediatric Care Medical Specialist.

Potassium Iodide (KI)

Children are susceptible to thyroid cancer after being exposed to radioactive iodine. The uptake of radioactive iodine needs to be blocked by administering oral potassium iodide (KI) **within 4 hours** of exposure for exposures of ≥ 0.05 Gy (5 rad). See the dosing chart below.

Age of Patient	Dose
<1 month	16 mg PO
1 month-3 years	32 mg PO
4-18 years	65 mg PO
Pregnant or lactating women	130 mg PO

Protective effects of KI lasts approximately 24 hours and is usually given once. If child is unable to be evacuated to a safer area within 24 hours, contact Pediatric Care Medical Specialist for the possible need for repeat doses.
If liquid form is not available, below are the steps for how to convert the KI tabs to KI solution:

1. Place one 130 mg tablet (or two 65 mg tablets) into a bowl and grind into a fine powder.
2. Add 20 mL of water to bowl and dissolve the KI powder.
3. Add 20 mL of milk, juice, soda or syrup to flavor the KI/water mixture
4. Resulting solution has a concentration of 16.26 mg/5 mL
5. Unused iodine mixture may be stored in the refrigerator for up to 7 days.

Other considerations:

- Need to monitor a newborn's thyroid function 2-3 weeks after receiving KI because KI can cause a transient decrease in thyroxin and increase in the TSH level
- Breastfeeding:
  - The Food and Drug Administration (FDA) and American Academy of Pediatrics (AAP) have each released recommendations for breastfeeding after a mother has been exposed to radiation. The FDA's recommendation is a mother can breast feed after she has been treated with KI. The AAP recommends that mothers do not breast feed, even if they have been treated with KI unless no other alternative is available. For more information or assistance with determining if breast feeding should continue, consult the Pediatric Care Medical Specialist and/or REAC/TS.

Prussian Blue

Prussian Blue is utilized when the source is cesium, rubidium or thallium. The dosing recommendations are:

- Children 2-12 years old: 1 gm PO TID
- Children >13 years old: 3 gm PO TID

Approximate Thresholds for Acute Radiation Syndromes

Dose		Signs/Symptoms*
0-100 rads (0-1 Gy)	NA	Generally asymptomatic, potential slight drop in lymphocytes later (near 1 Gy)
> 100 rads (> 1 Gy)	Hematopoietic	Anorexia, nausea, vomiting, initial granulocytosis and lymphocytopenia.
> 6-800 rads (> 6-8 Gy)		Early severe nausea, vomiting, watery diarrhea, pancytopenia
> 2000 rads (> 20 Gy)	Cardiovascular/ CNS	Nausea/vomiting within first hour, prostration, ataxia, confusion

* At higher doses the time to onset of signs/symptoms may be compressed.

Psychological Considerations

Radiation emergencies, whether it be from a leak at a nuclear power plant or from a terrorist type incident such as a dirty bomb, leads to significant public anxiety. The anxiety associated with such events can appear out of proportion to the radiation induced health effects and can greatly affect the entire community. Many patients may present with symptoms such as nausea. It is important for providers to determine if nausea is from contamination or from the anxiety of the event. Long term psychological effects can manifest years after an event. General examples of long term effects include: feelings of vulnerability, PTSD, chronic anxiety, feelings of loss of control, fear of safety and health of themselves as well as future generations, and multiple idiopathic physical symptoms (MIPS). Provide educational materials and counseling options to all patients and their families after a radiological emergency.

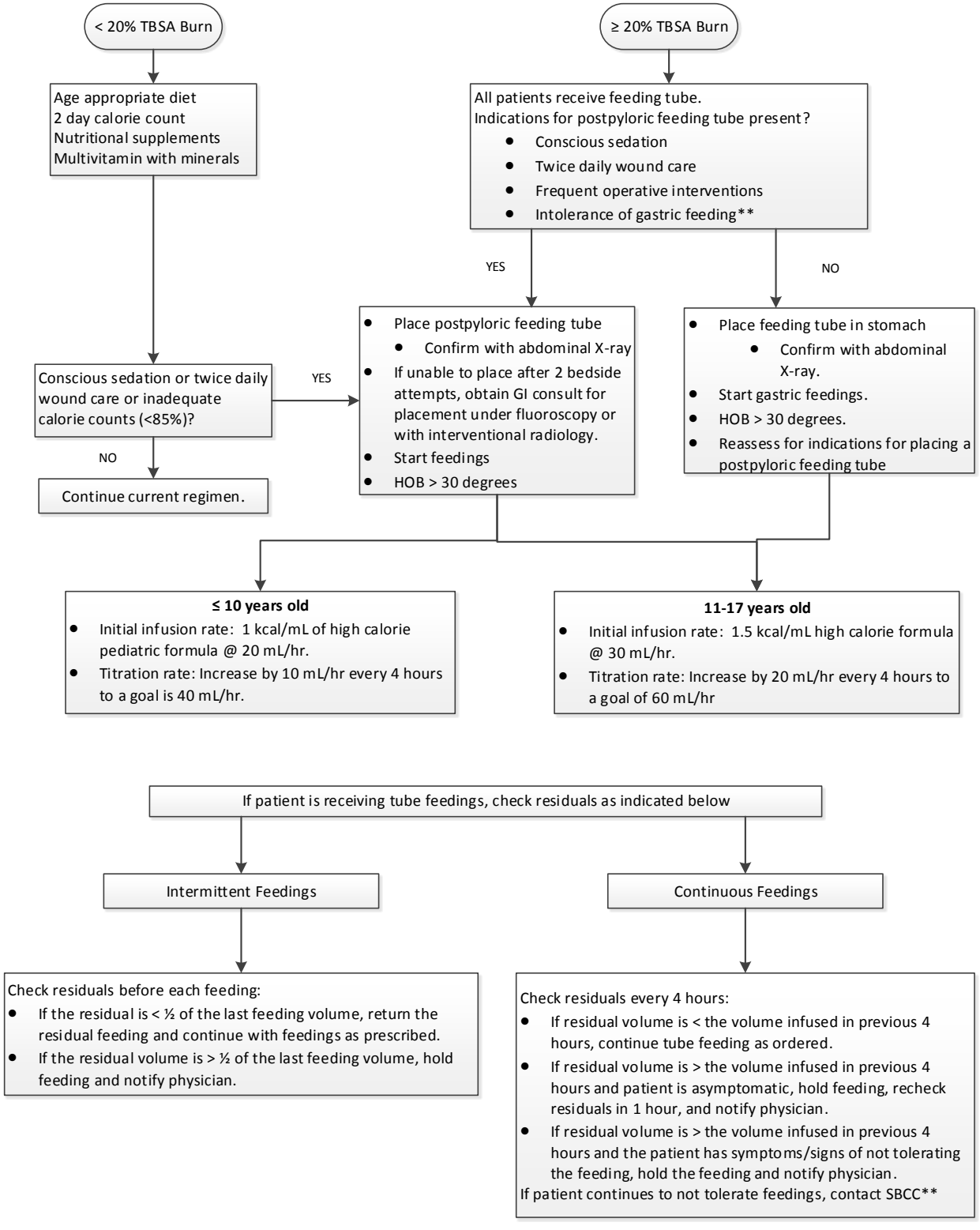
Radioactive Contamination versus Exposure

- Radioactive contamination: radioactive material is on or inside a person
  - External contamination-radioactive material is only on outside of a person
  - Internal contamination-radioactive material is ingested, inhaled, or absorbed through the skin or open wound
- Radiation exposure: a person is exposed to radioactive materials
- Difference between contamination and exposure:
  - Person exposed to radiation may not be contaminated. An radiation exposure means radioactive material penetrated the person's body. For a person to be contaminated with radioactive materials, the materials must be on or inside of the person's body.

General Information about Radiological Decontamination

- Typically is not emergently needed as compared to chemical decon
  - ***Can begin treatment for life threatening conditions before initiating decon***
  - Low risk to health care providers if decon is delayed
- Radioactive material cannot be neutralized, only moved from one point to another
- Clean dry sheet or drapes should be applied to the area to prevent spread of contamination to uncontaminated areas
- Standard pediatric considerations for decontamination apply:
  - Use warm water (98°-110°F)
  - Do not carry infants/young children through decon shower
  - Have rewarming measures available after decon is completed
- Clean wound via baby wipes or via irrigation
  - Options: baby wipes, irrigation, OR soft cloth with soap and tepid water
- Irrigation:
  - Irrigate would/orifice/area with sterile saline or equivalent
  - Prevent splashing
- Run-off should be directed into a receptacle (i.e. lined garbage can)
  - Keep all waste (run-off, absorbent pads, sheets, towels) for later collection and disposal
- Repeat until no further contamination is noted.
- Minor debridement may be needed if wound has foreign bodies in it
- After decon completed, clean wound as per hospital protocol.
- Other considerations:
  - Partial thickness burns:
    - Always irrigate
    - Leave blisters closed
    - Irrigate open blisters
  - Full thickness burns:
    - Radioactive contaminate will slough in eschar
    - Contaminates will remain in layers of dead tissue

Nutritional Algorithm for Pediatric Burn Patients



** Intolerance of feedings can be a sign of sepsis in burn patients