Burn with Inhalation Injury

Section 1: Case Summary

Scenario Title:	Inhalation Burn
Brief Description of Case:	Patient taken out of a live fire with burns to the face with inhalation injury and cyanide toxicity.

Goals and Objectives	
Educational Goal:	Recognize the need for early and advanced airway management in Pediatric burn patients. Recognize potential other causes of dyspnea Recognize potential for CO and CN exposure Review Handtevy dosing for Pediatrics- airway medications, pain medications Review Handtevy sizing of Pediatric airway equipment
Objectives: (Medical and CRM)	Recognition and preparation for difficulty airway/inhalational injury Recognize need for Pediatric burn center transport

Learners, Setting and Personnel			
Location:	☐ Sim Lab	☐ In Situ	☒ Other: Fire Training Ground
Recommended Number of Facilitators:	Instructors: 1-2		
	Sim Actors: 1		
	Sim Techs: 0		

Scenario Development	
Date of Development:	10/21/2024
Scenario Developer(s):	Jeffrey Katz
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Last Revision Date:	10/21/2024
Revised By:	Katz
Version Number:	1

Section 2A: Initial Patient Information

A. Patient Information (given by facilitator as if they are a family member)					
Patient Name: Joseph Sparks			Age: 12	Gender: M	Weight: 65 Kg
Presenting complaint: Difficulty breathing after fire					
Temp: 99.8	HR: 136	BP: 90/60	RR: 34	O_2Sat: 92	FiO_2: room air
Cap glucose: 96			GCS: (E V M) 13 (E3,M6,V4)		
Patient scenario: *Patient was in his room gaming on a computer when the fire broke out. The patient was taken out of the residence by EMS but there was a flash of fire that burned the face, neck, and chest. Patient has now been removed from the scene and handed to the rescue team for further care.*					
Allergies: NKDA					
Past Medical History: Seasonal Allergies			Current Medications: None		

Section 2B: Physical Exam

B. Physical Exam	
List any pertinent positive and negative findings	
Cardio: tachycardia	Neuro: AOx4
Resp: stridor	Head & Neck: burns noted
Abdo: NA	MSK/skin: Burns noted to face, neck and chest
Other:	

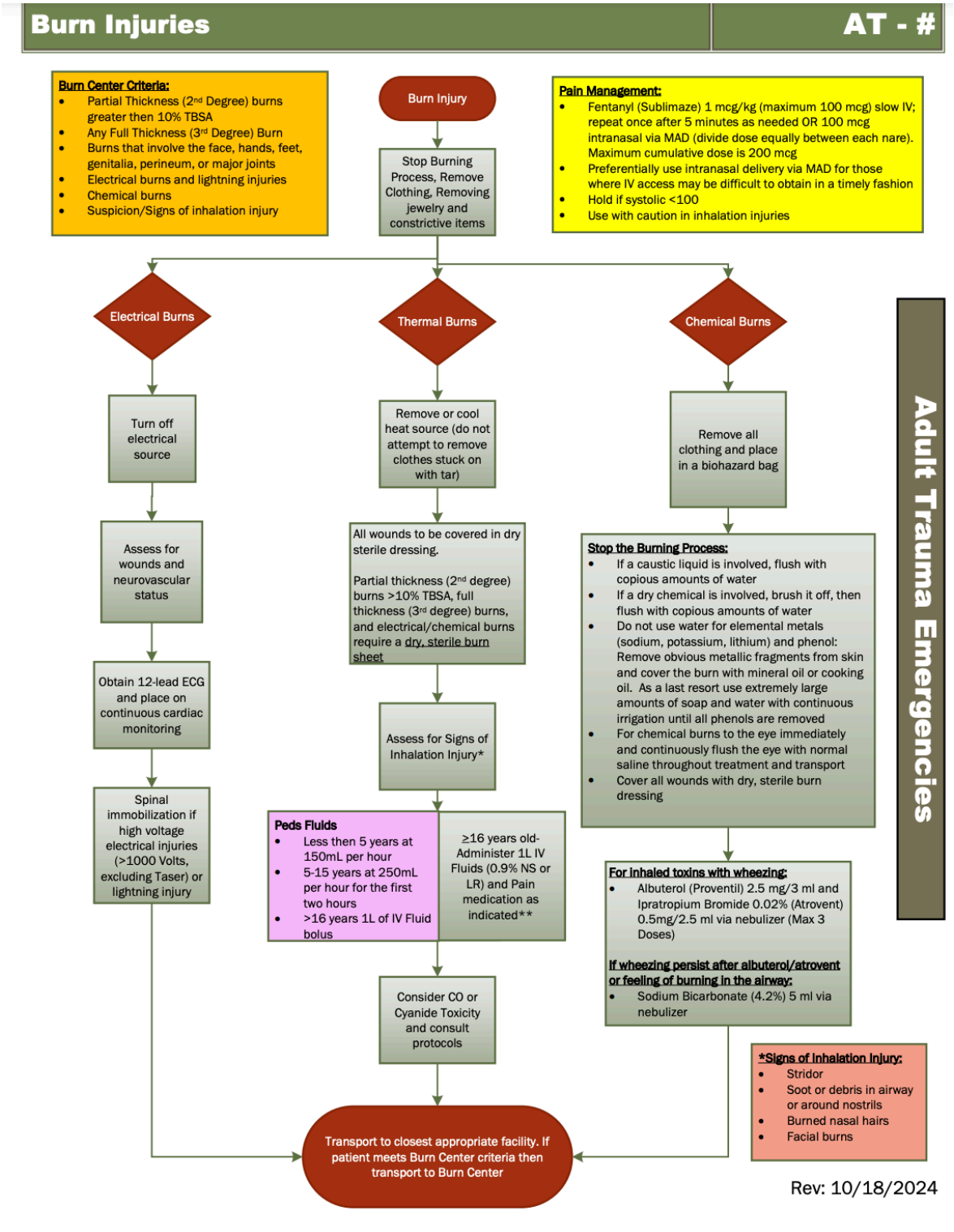
Section 3: Technical Requirements

A. Patient
☒ Mannequin *(specify type and whether infant/child/adult)* – *With airway capability*
B. Special Equipment Required
Monitor, Drug Box, Airway equipment (laryngoscope, Multiple tube sizes, bougie, stylet, Video laryngoscope), BVM, NRB, NC, Burn Dressing, Cyanokit (only if would be available in real circumstance)
C. Required Medications
Fentanyl, NS, Etomidate/Ketamine, Cyanokit (if would be available in real circumstance)
D. Moulage
Burn and soot to airway and face and chest. Necklace on patient (to be removed by paramedics)
E. Patient Reactions and Exam/ Case Progression
Patient will have worsening stridor and soot to the mouth and nares. Patient will also have 2nd degree burns to the chest and neck. Stridor will get louder as scenario keeps going. (Instructor can mimic this noise or play it on the phone). *Requires intubation. Although it should be difficult, it will be successful.* *BP will only improve with fluids.* *O2 will only improve with supplemental oxygen (NRB and upwards)*

Section 5: Scenario Progression

Scenario States, Modifiers and Triggers				
Patient State/Vitals	Patient Status	Learner Actions, Modifiers & Triggers to Move to Next State		Facilitator Notes
1. Baseline State Rhythm: Sinus Tach HR: 136 BP: 90/60 RR: 34 O_2SAT: % - 92 T: ^oC – 99.8 GCS: 13 (E3,M6,V4) BGL 96 SpCO 5% ETCO2- 10 (only show if placed on pt)	*Patient is breathing rapidly and is confused after being taken out of a fire*	Expected Learner Actions ☐ Cardiac monitor ☐ Assess Patient (2nd deg to neck/chest, soot on face) ☐ IV Access ☐ Fluid Resuscitation ☐ Identify stridor and airway concern ☐ Cover patient ☐ Pain management ☐ Obtain ETCO2 as surrogate for lactate to determine CN exposure ☐ Remove necklace	Modifiers *Changes to patient condition based on learner action* - BP Improves if IVF given BP: 110/70 -Oxygen saturation will worsen if not on oxygen Triggers *For progression to next state* - If not on oxygen hypoxia worsens. Mental status will also worsen.	Patient will be confused with eyes closed. Stridor can be mild initially but should worsen throughout the scenario. Aircare cant fly. (facilitator can act as family member & give medical hx; facilitator can also act as patient)
2. Rhythm: Sinus Tach HR: 110 (if fluids given) BP: 110/70 (if fluids given) BP: 86/40 (if no fluids) RR: 26 O_2SAT: % - 97 on O2 O2 SAT: % 89% if only NC T: ^oC – 99.8 GCS: 10 (E3,M5,V2)	Worsening stridor on exam noted. Patient now showing sign of respiratory distress and worsening mental status	Expected Learner Actions ☐ Preoxygenation ☐ Airway preparation with multiple tube sizes and backups ☐ Have Cric kit available as back up ☐ Proper sedation dosage/administration ☐ Airway placement with EtCO2 Confirmation ☐ CO level if not yet done (5%). BGL if not yet done	Modifiers - Patient with signs of worsening airway requiring active management - If IV fluid not given previously patient will be hypotensive and should be resuscitated prior to intubation Triggers - If airway intervention is not preformed stridor will become worse. Patient will then have worsening hypoxia, respiratory distress, and mental status	

3. Vitals remain the same except: RR: 18 with BVM GCS: 3T (sedated) EtCO2 12	Patient intubated and sedated	Expected Learner Actions ☐ Post intubation management ☐ Sedation/Pain control ☐ ETCO2 monitoring ☐ Check CO level if not already done ☐ Transport to burn center	Modifiers - Should voice transporting to burn center (Arnold Palmer- Pediatric Hsopital) Triggers - IF goes to hospital other then burn center, receiving team should mention calling for transfer right when report is finished	Burn center will suggest Cyanokit due to lower ETCO2 (possible Cyanide Toxicity)



Additional Facilitator Debriefing notes

- If unable to establish airway with ETT need to divert to closest facility for unstable airway. If able to intubate should continue to burn center
    - Overall time is saved with driving to Peds Burn Center than going to a Peds community hospital and them having to transfer (on average it takes about 4 hours to transfer patient)
    - Cric could be difficult (neck burns)
- "Can't Ventilate" AND "Can't Intubate"= cric
    - Review Pediatric HandTevy dosages for induction medications and pain control.
    - Igel would need to be performed prior to saying you can't intubate and can't ventilate.
    - Can't ventilate= no ETCO2
    - Can't intubate= most experienced can't get the tube
- Review Carbon Monoxide Poisoning
    - CO poisoning at lower levels usually causes vague symptoms: include headache, fatigue, and irritability. At higher levels can cause paresthesias, seizures, arrhythmias syncope.
    - Hyperbaric indications-
- Review Cyanide Poisoning
    - Housefires & suicidal kits
    - CN poisoning is difficult to detect, and may cause a syndrome including confusion, dyspnea, headache, Altered LOC, or seizures - Soot in the mouth or expectoration and even Cardiac arrest.
    - Disables the body's ability to use oxygen, so it can be fatal despite administration of oxygen.
    - Lactate tends to be elevated, therefore decreased ETCO2 can serve as a surrogate marker
    - Tx: Hydroxycobalamin (Cyanokit)
    - The Cyanokit® is packaged in two ways:
        - A two vial kit with 2.5g of hydroxocobalamin each in powder form which must be reconstituted with 100mL of normal saline each, rotated or tipped for 30 seconds each (not shaken) and then administered through its own IV line (not used with any other medications) over 7.5 minutes each.
            - Peds: Two Vial Kit (2.5g/100mL): AGE GROUP AMOUNT DOSAGE Infant/Toddler (0-2 years) ¼ bottle 0.625g Preschool (3-5 years) ½ bottle 1.25g Grade School (6-13 years) 1 bottle 2.5g Adult > 14 years 2 bottles (entire kit) 5g
        - A one vial kit with 5g of hydroxocobalamin powder which must be reconstituted with 200mL of normal saline, be rotated or tipped for 60 seconds (not shaken) and administered through its own IV line (not used with any other medication) over 15 minutes. B. The starting dose of hydroxocobalamin for adults is 5g (i.e., two 2.5g vials OR one 5g vial) administered as an intravenous (IV) infusion over 15 minutes
- There are a number of drugs and blood products that are incompatible with Cyanokit®, thus Cyanokit® requires a separate intravenous line for administration