

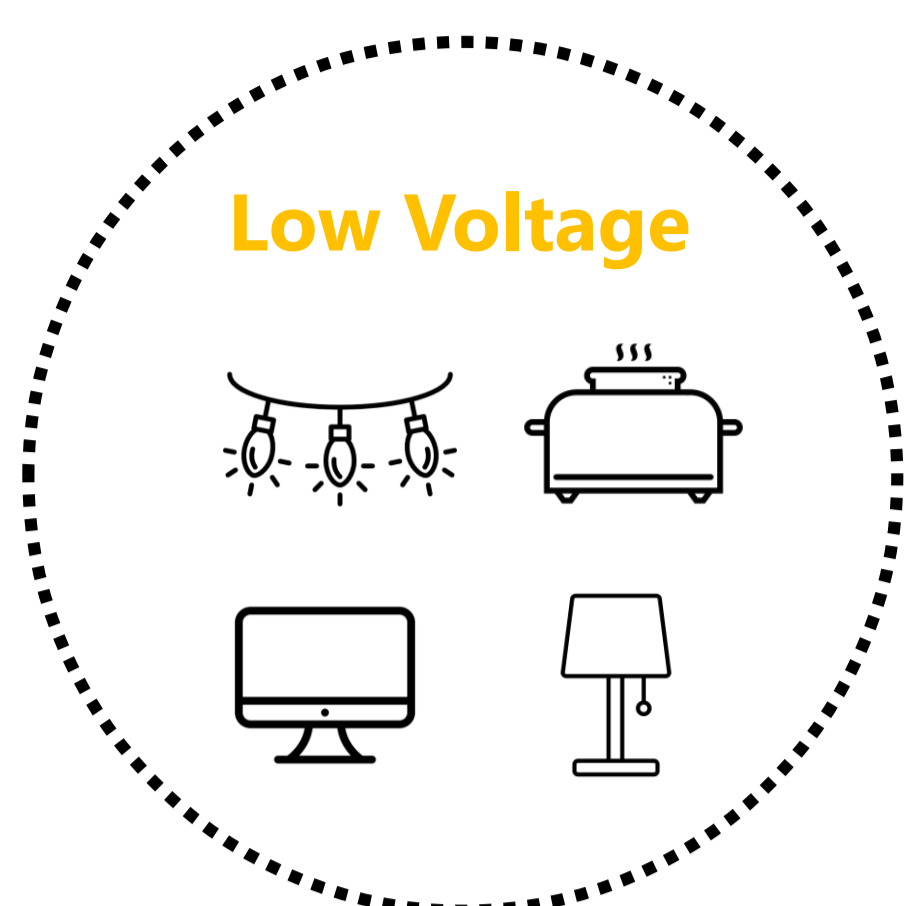


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# ELECTRICAL INJURIES

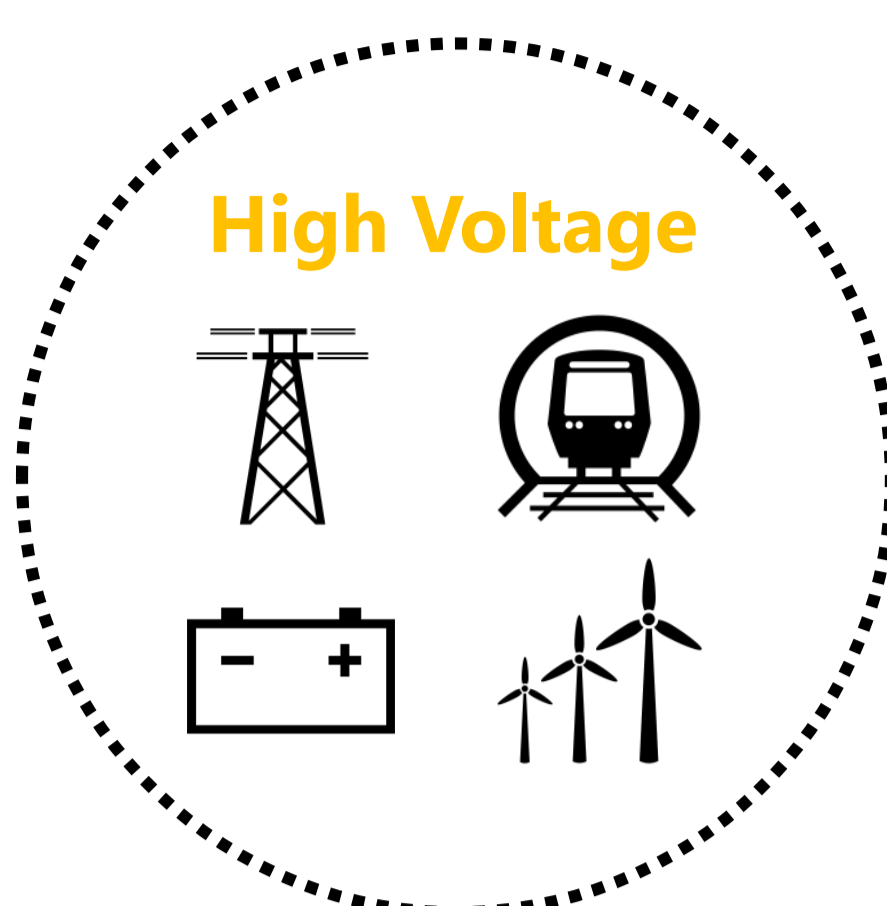
Remember that with any burn or electrical injury patient is that they are a **trauma patient first**. Follow your primary and secondary survey and only then attend to the burns and electrical injuries

## RISK STRATIFICATION OF ELECTRICAL INJURIES



Less than **600V**

VS



Greater than **600V**

Additional Factors

1. **Duration of Contact**
2. **Degree of Wetness**

**ALTERNATING CURRENT** causes **prolonged contraction** preventing full release from electrical source and hence longer duration of contact and **more tissue damage** compared to **DIRECT CURRENT**



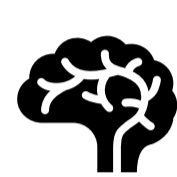
### LIGHTNING STRIKES



1. **Direct Current**
2. **Brief Contact**



High **survival rates of 70-90%**, but up to **80%** of survivors **sustain long-term morbidity**



Patients may initially appear deceased with fixed and dilated pupils (autonomic dysfunction) and cold mottled extremities from vasospasm



Asystole occurs from direct depolarization of the myocardium but typically spontaneous ROSC is achieved



Respiratory arrest from medullary paralysis can take longer to resolve and patients may develop a secondary hypoxic arrest.

## Emergency Sequelae and Complications of Electrical Injuries

**CARDIAC COMPLICATIONS**

Serious cardiac complications from electrical injury relatively **uncommon**

Bundle Branch Blocks  
AV Blocks  
QT prolongation  
ST changes  
Atrial Fibrillation

Common, Non-Fatal, Self Resolving

**FATAL ARRHYTHMIAS**

**Ventricular Fibrillation** **Asystole**

*More common with AC exposures* *More common with DC exposures*

*Most common fatal arrhythmia*

**RHABDOMYOLYSIS AND AKI**

**CK elevation correlates** to the **extent of muscle injury**, but is not directly related to the probability of developing AKI

**Urine myoglobin** has poor sensitivity

**TREATMENT PRINCIPLES**

1. **Correction of volume depletion** until the plasma CK level is stable
2. **Forced alkaline diuresis**, using sodium bicarbonate to prevent intratubular cast formation
3. Consider **mannitol** or **furosemide** in the presence of obvious myoglobinuria after fluid resuscitation to prevent acute tubular necrosis and renal failure

**ELECTRICAL CORD BITE INJURY**

Injury to the corner of the mouth in **children** is not uncommon after **chewing** on an electrical cord

**Burns** **Bleeding**

*Look for any tongue and palate burns. Delayed massive bleeding from the labial artery can present 5 – 14 days when the eschar separates*

**COMPARTMENT SYNDROME**

Direct Muscle Injury      Indirect Muscle Injury

↓      ↓

Compartment Syndrome

**Regularly assess limbs for:**

- Significant Pain on Passive Extension
- Rigid Compartments
- Signs of Poor Perfusion

## Management Principles of Electrical Injuries

### Fluid Resuscitation

1. **Continuous Infusion > Bolus**  
Minimizes tissue edema that could worsen tissue damage
2. **Patient Require More Fluid**  
Use the modified Brooke/Parkland Formula
3. **Start with RL at 300-500mL/hr**  
Then titrate to a urine output >100cc/hr and other signs of adequate organ perfusion

### Cardiac Monitoring



Our experts recommend **6-8 hours of cardiac monitoring** for high voltage injuries



In patients with a low voltage exposure in the absence of chest pain or syncope, the literature **does not support need for cardiac monitoring**

### Disposition



Asymptomatic **low voltage** injured patients can be **discharged safely after a normal ECG**



For **high voltage injuries**, the literature suggests **observing the patient for 12 hours** even if they are asymptomatic, with a **referral to a burn center**

*Finally, discharge instructions are very important as there are delayed complications from electrical injuries. Counsel regarding delayed symptoms including psychological, neurological, limb ischemia and for kids who bite on an electrical cable, delayed bleeding*