**History**
- Peritoneal or hemodialysis
- Anemia
- Catheter access noted
- Shunt access noted
- Hyperkalemia

**Signs and Symptoms**
- Hypotension
- Bleeding
- Fever
- Electrolyte imbalance
- Nausea or vomiting
- Altered mental status
- Seizure
- Cardiac arrhythmia

**Differential**
- Congestive heart failure
- Pericarditis
- Diabetic emergency
- Sepsis
- Cardiac tamponade

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**Shunt or fistula bleeding?**

- **No**
  - **CHF or pulmonary edema?**
    - **No**
      - **Cardiac arrest?**
        - **Yes**
          - **Exit to appropriate TG**
        - **No**
          - **Establish IV/IO**
            - **Calcium Chloride 1g IV/IO**
            - **Sodium Bicarbonate 50mEq IV/IO**
            - **Exit to appropriate TG**
    - **Yes**
      - **Exit to CHF/Pulmonary Edema TG**

**Blood glucose analysis**

- If systolic blood pressure is < 90:
  - Normal Saline bolus 500ml
  - Repeat to goal SBP > 90
  - Maximum 1L

- Calcium Chloride 1g IV / IO over 2-3 minutes
- Sodium Bicarbonate 50mEq IV / IO
- Albuterol nebulizer 5mg
  - May repeat x3 or until IV meds are administered

- **Exit to Diabetic TG**

**Serious signs/symptoms?**

- **Yes**
  - **Exit to Hypotension TG**
- **No**
  - **Establish IV/IO**
  - **Cardiac monitor**
  - **Blood glucose ≤ 60 or ≥ 350 mg/dl?**
    - **Yes**
      - Peaked T-wave and wide QRS? (QRS ≥ 0.12 sec)
        - **Yes**
          - **Exit to Diabetic TG**
        - **No**
          - **Establish IV/IO**
    - **No**
      - **Notify destination or contact Base Hospital**
Peaked T-waves are a sign of hyperkalemia. Increased extracellular potassium reduces myocardial excitability, which results in the depression of both pace making and conducting tissues. Progressively worsening hyperkalemia leads to suppression of impulse generation by the SA node and reduced conduction by the AV node and HIS-Purkinje system, resulting in bradycardia and conduction blocks that ultimately lead to cardiac arrest.

In order to treat hyperkalemia in the prehospital setting, the QRS must be ≥ 0.12 seconds. If the patient has not yet arrested, be prepared for the patient to do so. Early recognition and treatment is essential to helping reverse this critical condition.

**Pearls**

- Do not take blood pressure or start IV in extremity which has a shunt/fistula in place.
- Access of shunt or dialysis catheter is indicated in the unstable or cardiac arrest patient when no other IV/IO access is available.
- If local pressure does not control significant hemorrhage from dialysis fistula or shunt, utilize a tourniquet to stop bleeding. Apply the tourniquet as far away from the fistula or shunt as possible.
- Always consider hyperkalemia in all dialysis or renal failure patients.
- Sodium Bicarbonate and Calcium Chloride should not be mixed. Ideally, administer in separate lines.
- Renal failure and dialysis patients generally have numerous medical problems. Hypertension and cardiac disease are prevalent.