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?**
    - **Yes**
      - Exit to CHF/Pulmonary Edema TG
    - **No**
      - **Cardiac arrest?**
        - **Yes**
          - Exit to appropriate TG
        - **No**
          - Establish IV/IO

**Establish IV/IO**

- **Calcium Chloride 1g IV/IO**
- **Sodium Bicarbonate 50mEq IV/IO**

Exit to appropriate TG

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**Blood glucose analysis**

- **12-Lead ECG**
- **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**
      - Normal Saline bolus 500ml
      - Repeat to goal SBP > 90
      - Maximum 1L
      - Calcium Chloride 1g IV / IO
      - Sodium Bicarbonate 50mEq IV / IO
      - Albuterol nebulizer 5mg
      - May repeat x3 or until IV meds are administered
      - Notify destination or contact Base Hospital

Exit to Hypotension TG

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**Apply firm finger tip pressure to bleeding site**

- **Apply dressing but avoid bulky dressing**
- **Dressing must not compress fistula or shunt as this will cause clotting**
- **If direct pressure and dressing are not effective and significant hemorrhage continues, apply tourniquet to affected extremity far away from fistula/graft**

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**Notify destination or contact Base Hospital**
Pearls

- Do not take blood pressure or start IV in extremity which has a shunt/fistula in place.
- For dialysis patients whose peripheral access site (fistula/graft) has already been accessed, the existing IV line may be used by a paramedic for administration of fluids or medications.
- Paramedics may access a dialysis fistula/graft if the patient is in cardiac arrest and attempts at IV and IO access have failed.
- 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/graft 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.

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.