1. **The pathogenesis of a vascular access aneurysm includes:**
   A. Repeated punctures at the same cannulation site
   B. Vessel trauma and thinning
   C. Outflow stenosis
   D. High blood flow rate combined with a maturing AVF
   E. A, B and C

   **Answer: E**
   Repeated punctures at the same cannulation site, vessel trauma and thinning, along with outflow stenosis, all contribute to the pathogenesis of a vascular access aneurysm. High blood flow rate combined with an AVF that has been in use for a longer duration is also a contributing factor.

2. **Fatal vascular access hemorrhage (FVAH) occurs most often:**
   A. In the dialysis unit
   B. During hospital admission for an infected vascular access site
   C. In the patient's home or nursing home residence
   D. During endovascular stent placement

   **Answer: C**
   Because of poor monitoring and the most common “treatment plan” for aneurysms being “wait and watch,” one study found that most patients experienced FVAH in their home or a nursing home. This outcome is unacceptable considering that FVAH is preventable through careful monitoring and education of both staff and patients.

3. **An effective and reasonable monitoring plan for vascular access aneurysm includes:**
   A. Routine physical examination
   B. Measurement and photograph of the site every 3 months, along with proper documentation of findings
   C. Ultrasound evaluation every 6 to 12 months and cardiac output as clinically indicated
   D. Patient education
   E. All of the above

   **Answer: E**
   Continual monitoring is necessary to determine if the aneurysm is either stable or enlarging, or changing in any way that would indicate the need for timely intervention. Clinical examination is always requisite, and duplex ultrasound is an adjunctive assessment tool.
Patient education on aneurysm inspection and preventive measures are essential for avoiding injury, infection, and FVAH.

4. **Primary failure (new access that is never usable for dialysis) is more common with:**
   A. AVF
   B. AVG
   C. No difference

**Answer: A**
Primary failure is much higher for AVF than AVG. AVF non-maturation may be due to early thrombosis or inadequate dilation.

5. **Time from access creation to first successful cannulation is:**
   A. Longer for AVF
   B. Longer for AVG
   C. No difference

**Answer: A**
According to DOPPS, 78% of AVG, but only 2% of AVF, are cannulated within one month of surgery.

6. **If you include primary failures (intent-to-treat analysis) access survival is:**
   A. Longer for AVF
   B. Longer for AVG
   C. No difference

**Answer: C**
When primary failures are excluded, AVF have longer survival than AVG. However, AVF and AVG survivals are similar when primary failures are included (because primary failure is higher for AVF than AVG).

7. **Which type of access requires more frequent interventions to maintain patency for dialysis?**
   A. AVF
   B. AVG
   C. No difference

**Answer: B**
AVG require interventions (angioplasty, thrombectomy, or surgical revision) approximately 3 times more frequently than AVG to maintain long-term patency for dialysis.
8. **Research has demonstrated that:**
   A. The risk for AVF infection is greater with standard needling techniques than with the buttonhole technique
   B. The most common organism implicated in buttonhole infections is *S.aureus*
   C. The buttonhole technique should not be considered a viable cannulation option
   D. The buttonhole technique is associated with a lower incidence of hematoma formation than standard needling techniques
   E. B and D

**Answer: E**
Observational studies and RCTs have demonstrated that AVF infection is greater with the buttonhole technique than with standard needling techniques. The buttonhole technique is an important cannulation option for specific indications.

9. **Indications for using the buttonhole technique include:**
   A. Limited cannulation length / site
   B. Aneurysmal AVF
   C. Painful cannulation
   D. Preservation of a damaged AVF
   E. All of the above

**Answer: E**
The buttonhole technique can be considered for the situations listed above, as well as for self-care or home hemodialysis with a reliable patient or home cannulator.

10. **Creating a viable buttonhole tract includes:**
    A. Approximately 6-14 cannulations with a sharp needle and the same cannulator
    B. Not leaving any part of the needle exposed during insertion
    C. Proper scar tissue development in the tunnel tract
    D. Cannulation in the same spot, at the same angle and depth, every time
    E. A, C and D

**Answer: E**
Creating a viable buttonhole tract includes leaving 1/16" of an inch of the needle exposed so that the needle hub does not get buried in the entrance of the tunnel tract, thus avoiding “hubbing.” Hubbing can lead to an increased risk of problems with scab removal, bleeding, and infection.