1) From an infection control standpoint, the appropriate place to place a central venous catheter is:
   a) The subclavian vein
   b) The internal jugular vein
   c) The femoral vein
   d) In a peripheral vein (i.e. a PICC line)

Both the internal jugular vein and femoral vein have 2-3 fold increased risk of colonization and bacteremia compared to the subclavian vein in multiple studies. While there is data supporting PICC line usage in the outpatient setting, emerging data suggests that infection rates are higher with PICC lines in the ICU setting. Although there are valid reasons to place CVCs in other veins that are independent of infection risk, the subclavian vein has the lowest risk of infection.

2) The appropriate prep when placing a central venous catheter is
   a) Betadine
   b) Tincture of iodine
   c) Alcohol
   d) Chlorhexidine

A prospective, randomized trial comparing chlorhexidine prep with betadine prep showed CLABSI rates with the former. The CDC and infection control groups now recommend to “prepare clean skin with a >0.5% chlorhexidine preparation with alcohol before central venous catheter and peripheral arterial catheter insertion and during dressing changes.” Chlorhexidine should be allowed to air-dry prior to placing the catheter.

3) When should antiseptic or antibiotic impregnated central venous catheters be placed
   a) They are never cost effective and should never be placed
   b) When infection rate is >5.5/1000 catheter days
   c) **When infection rates are above goal rates in after implementing a comprehensive strategy to reduce CLABSI**
   d) When infection rates are above the NHSN national average as reported by the CDC

The first line effort to decrease CLABSI should be instituting a comprehensive strategy which includes a) educating providers who insert and maintain catheters, b) use of maximal sterile barrier precautions, and c) using a chlorhexidine prep during central venous catheter insertion. There is extensive data that such an approach can markedly reduce CLABSI rates as low as 0, over an extended follow-up period. If this is not successful, antiseptic or antibiotic-impregnated catheters have been shown to reduce CLABSI rates without increasing long-term resistance. This should be thought of as an adjunctive strategy when primary efforts are unsuccessful in getting your ICU down to goal rates set by your institution.

4) The greatest risk factor for development of ventilator associated pneumonia in surgical patients is
   a) Polytrauma
b) Alcohol abuse

c) **Duration of mechanical ventilation**

d) Burn

A recent multivariate analysis identified several risk factors that led to an increased risk of postoperative pneumonia, including type of surgery, age, functional status, recent weight loss, chronic obstructive pulmonary disease (COPD), type of anesthesia, impaired sensorium, history of a cerebrovascular accident, blood urea nitrogen (BUN) level, substantial transfusion, emergency surgical intervention, long-term steroid use, recent smoking, and significant recent alcohol use. In addition, surgical patients are much more likely to develop ventilator associated pneumonia, including 10-20% of patients who are the victims of inhalation injury. The single greatest risk factor for ventilator associated pneumonia, however, is the duration of mechanical ventilation. The risk peaks at day 5 on the ventilator, plateaus after day 15, and then declines significantly.

5) The most effective route of preventing pneumonia in a ventilated patient is

a) Feeding post-operative patients into the small intestine

b) **Positioning the patient with the head of the bed up at 30-45 degrees**

c) Routinely changing ventilator circuits and using single-use catheter suction systems

d) Selective decontamination of the digestive tract (SDD)

Positioning patients in a supine position markedly increases the risk of ventilator associated pneumonia. As such, unless a specific contraindication exists, all patients should be positioned with the head of the bed at least 30-45 degrees up. There is no convincing benefit to feeding a patient in the stomach or small intestine. Routinely changing ventilator circuits does not prevent ventilator associated pneumonia. The incidence of pneumonia is similar regardless of whether a single-use catheter system or closed multi-use catheter system is used for suctioning. The use of SDD is controversial. There are large-scale trials showing a small in mortality and a large decrease in gram negative pneumonia when following this protocol. However, due to concerns about breeding resistant organisms, SDD is not commonly used in the United States and is not recommended in most guidelines for pneumonia prevention.