ARE YOU SENDING A PROPER SAMPLE FOR MICROBIOLOGICAL TESTS: PART III: BLOOD CULTURE

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What is bacteraemia and septicemia?

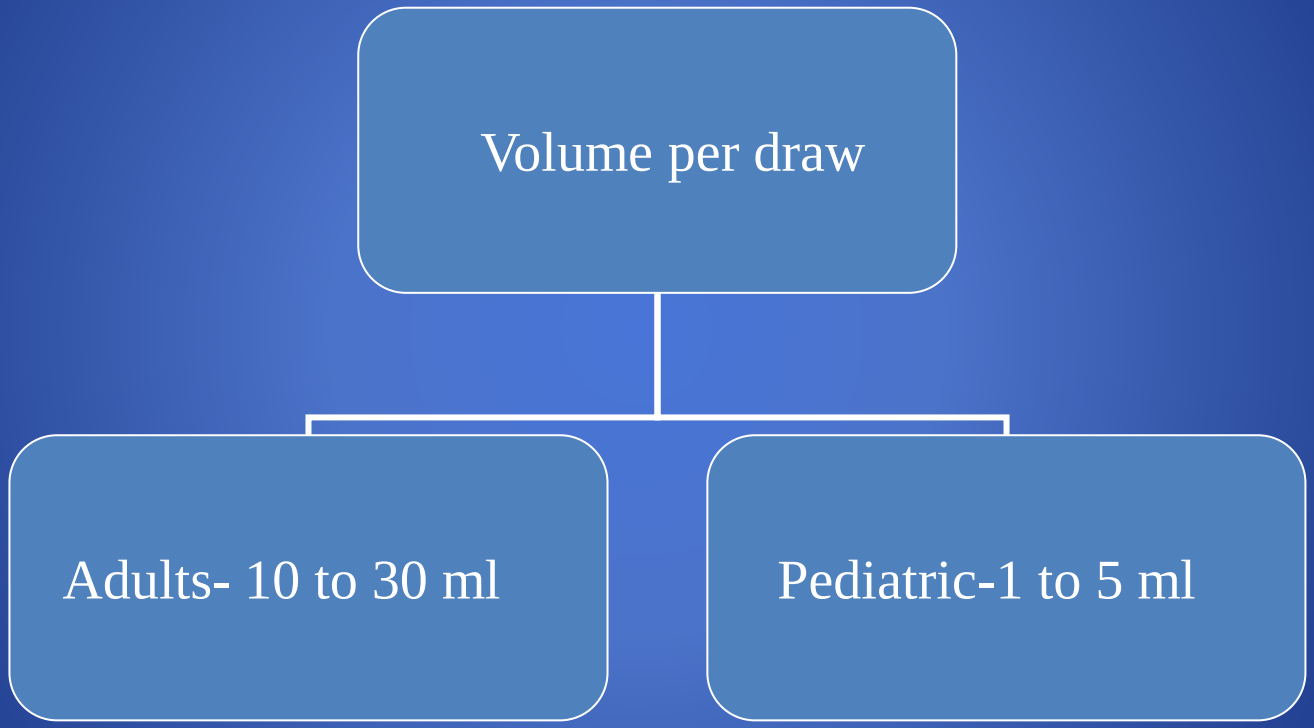
- Bacteraemia → presence of viable bacteria in the blood
  → transient, continuous or intermittent

- Sepsis or septicemia → bacteremia plus clinical signs and symptoms of bacterial invasion and toxin production

- It is characterized by the cardinal signs of inflammation
  - vasodilation
  - leukocyte accumulation
  - increased microvascular permeability

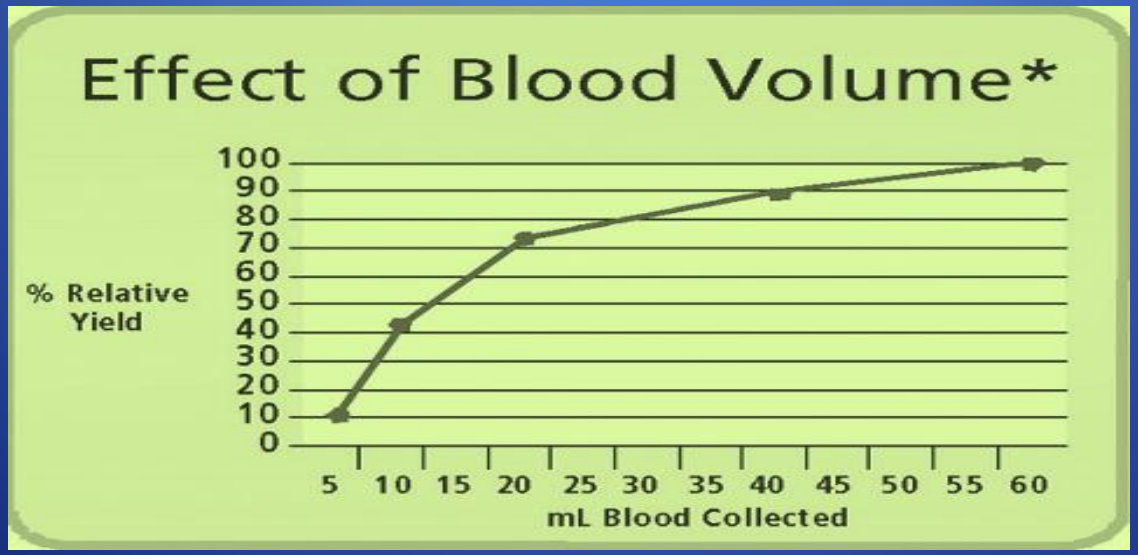
- Blood culture is the single most important procedure

What volume of blood should be collected?



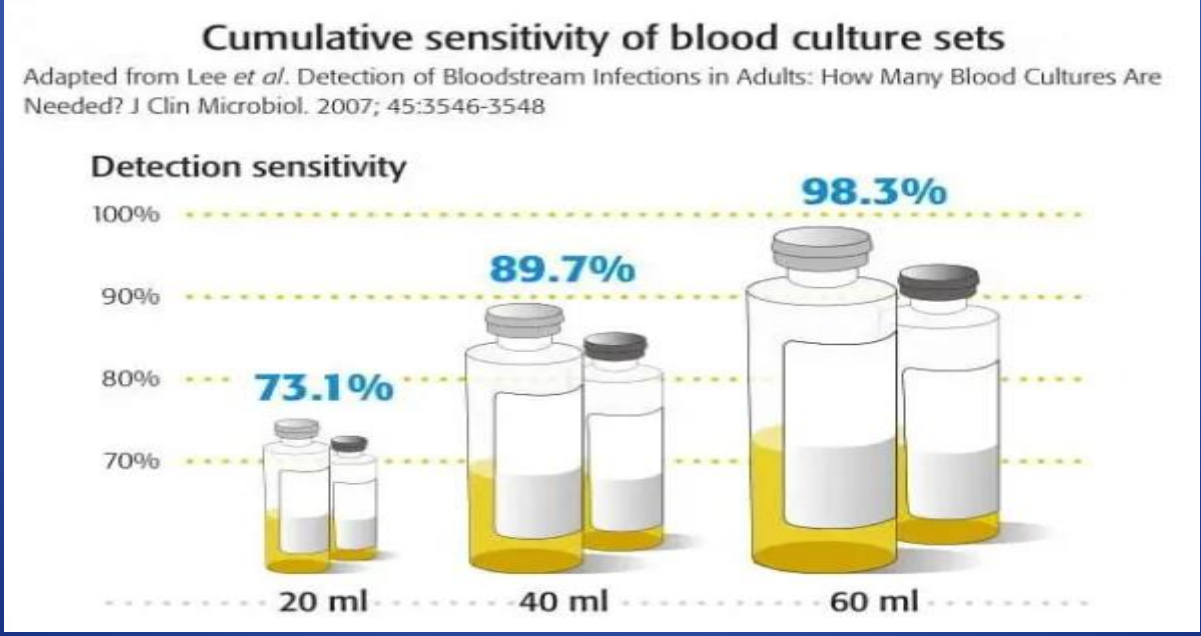
Volume of Blood

- Collect 40 ml of blood at one time, 20 ml from each of two separate venipunctures, from two different sites, using two separate needles and syringes.
- If less than 1 ml blood is obtained in a child , it should be entirely inoculated in an aerobic bottle.
- Every ml of blood increases sensitivity of blood culture by 3% in septic patient



Relevance of Number of sets

- Two or more sets = Higher recovery
- The current guideline is to collect 2 to 3 sets per episode
- *Single blood cultures should never be drawn from adult patients*
- Rationale:
  - To rule out false positives (true pathogen vs contaminant)
  - It increases blood volume drawn and hence sensitivity of isolation of the pathogen.



When should a blood culture be performed?

- After the onset of clinical symptoms
- Prior to the administration of antimicrobial therapy.

- Taking blood for culture is an important procedure
- Microorganisms are present on the skin surface of patients, staff, and the patient environment → result in contamination of blood cultures.

Method of Collection of blood for culture

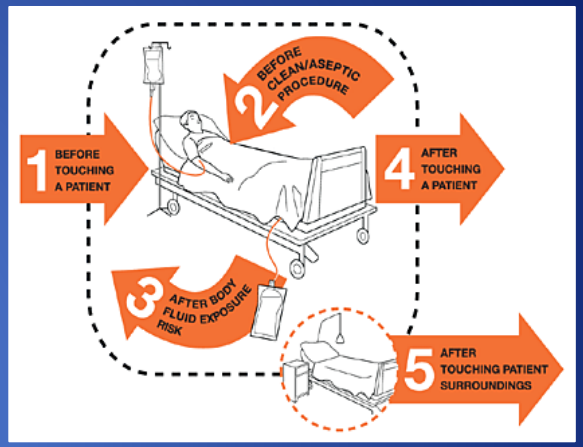
1. Disinfecting the rubber septum

- Remove the plastic cover (flip-off cap) from culture vials
- Wipe top of the vials i.e. rubber septum with 70% alcohol swab
- Allow to dry
- Why to disinfect the rubber septum?
  - The rubber septum of BC bottles are not sterile and may introduce contamination

Clinical and Laboratory Standards Institute (CLSI). Principles and Procedures for Blood Cultures: Approved Guideline. CLSI document M47-A. Vol. 46. No. 31. Wayne, PA: Clinical and Laboratory Standards Institute, 2007

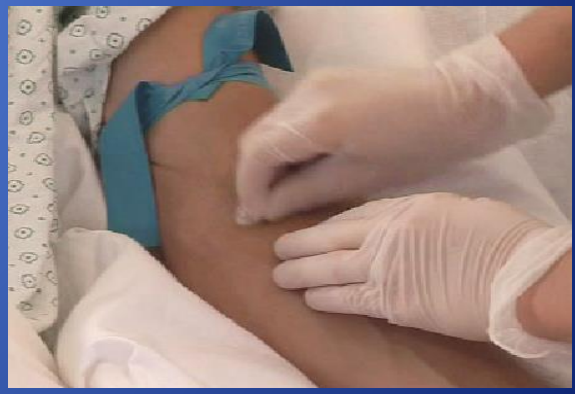
Method of Collection of blood for culture

2. Skin Preparation



PREPARE SKIN FOR VENIPUNCTURE

- Apply a disposable tourniquet and palpate to identify vein
- Clean hands using correct hand hygiene technique (use of WHO's '5 moments of hand hygiene')
- Dry your hands & apply sterile gloves
  - Use of sterile gloves reduces blood culture contamination by 50%



1.Kim NH, Kim H, Lee S, Kim K-H, Park SW, Kim HB, et al. Effect of routine sterile gloving on contamination rates in blood cultures. An Intern Med 2011;154:145-51.
2.http://www.who.int/gpsc/5may/background/5moments/en/

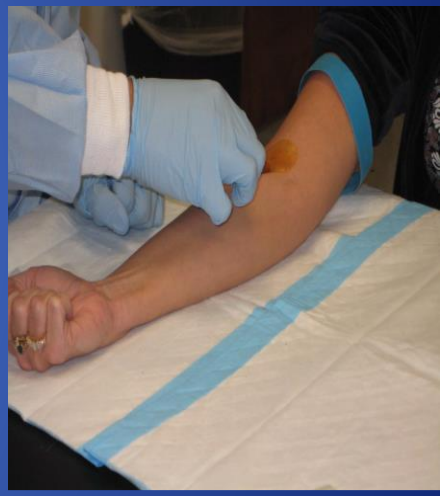
Method of Collection of blood for culture

PREPARE SKIN FOR VENIPUNCTURE

- Inadequate preparation of the skin→ most common cause of contamination

- Disinfection with 70% isopropyl alcohol. Allow to air dry for 30 seconds as organisms are killed while drying

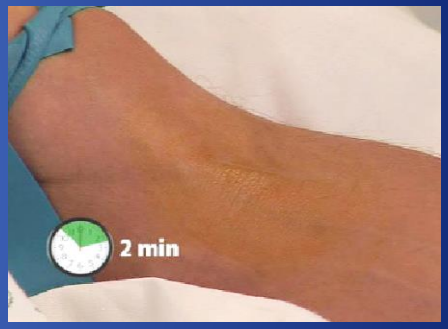
- Followed by, application of chlorhexidine→ start at the middle of the site, swab concentrically with 1 - 10% chlorhexidine-gluconate (CHG)



1.Calderia D, David C, Sampaio C. Skin antiseptics in venous puncture-site disinfection for prevention of blood culture contamination: systematic review with meta-analysis. J Hosp Infect 2011;77:223-32.
2.Wilson ML, Clinical and Laboratory Standards Institute. Principles and procedures for blood cultures: Approved guideline. Wayne, PA: CLSI 2007

Method of Collection of blood for culture

- Allow the site to air dry (about 1.5-2 minutes)
  - DO NOT fan, blow on site, or wipe off, as this may result in contamination of the blood culture
- Once disinfected, do not touch the skin again (even when gloved)
  - 'To avoid cross contamination, it is fundamental not to re-palpate the site after disinfection'
- If the venipuncture proves difficult and the vein must be re-palpated, the site must be re-cleansed

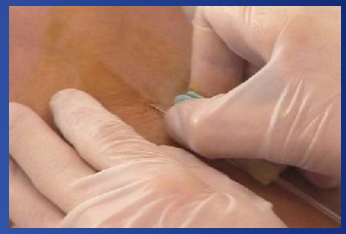


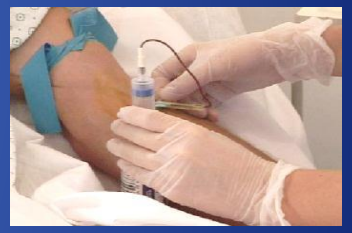
1.National Health Service (2007) Taking blood cultures: a summary of best practice Department of Health UK
2.Wilson ML, Clinical and Laboratory Standards Institute. Principles and procedures for blood cultures: Approved guideline. Wayne, PA: CLSI 2007

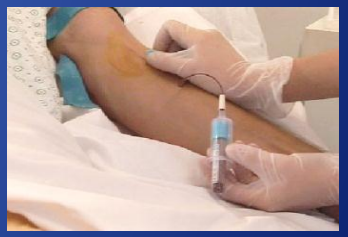
Sample collection

PERFORM VENIPUNCTURE (CLOSED COLLECTION)

- Attach winged blood collection set to blood collection adapter cap (Vacutainer holder cap)
- Insert needle into prepared site by holding wings of the needle
- Place Vacutainer holder cap over blood collection bottle and pierce septum
- Hold bottle upright and use bottle graduation lines to accurately gauge sample volume and collect sample







Sample collection

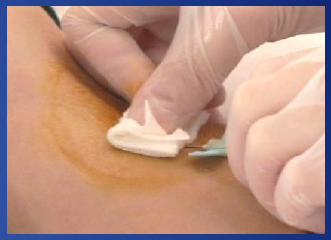
PERFORM VENIPUNCTURE (OPEN COLLECTION)

(open collection method should only be used where closed collection method is not available)

- Insert the needle into prepared vein and collect 10 to 20 ml blood in syringe
- Withdraw needle after collecting blood in the syringe and release tourniquet
- If blood is being collected for other tests, always inoculate the blood culture bottles first
- Distribute blood equally into aerobic and anaerobic vials

Skincare, Disposal & Label

- After all specimens have been collected, remove remaining skin antiseptic from collection site using a sterile-alcohol swab
- Dispose off the blood collection devices in the nearest sharps container as per the regulations
- Invert the bottle 4-5 times to ensure proper mixing of blood and medium
- DO NOT write on or place any labels over the vial barcode, as this is used by the instrument to process the specimen
- Inoculated bottles should be transported or stored at room temperature [DO NOT KEEP IT IN REFRIGERATOR]



Methods

Manual systems

- Conventional broth culture
- Septichek systems
- Oxoid signals
- Wampole Isolator

Automated systems

- Bac T / Alert
- Bactec
- ESP
- VITAL

Blood culture media

- Soybean-casein digest broth medium
- BHI broth
- Trypticase soy broth
- Supplemented peptone
- Thioglycollate broth
- Specialised broths

Additives include

- 0.006% - 0.05% SPS – most common
- Osmotic (hypertonic) agents
- Gelatin
- Resins

Handling Positive Blood Cultures

- All blood culture procedures are done in the biosafety cabinet
- When a positive culture is indicated according to the automated detection system, a Gram-stained smear performed
- Once morphology identified, inform the physician
- Subculture→ blood agar and MacConkey agar
  → biochemicals

- No growth→ kept for 7days

Thank- you