Collection and Transportation of Clinical Specimens

IDK II

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The laboratory diagnosis of an infectious disease

- the collection of a clinical specimen for examination or processing in the laboratory

4 RIGHT

1. the right *proper* collection ,
2. collected at the right *time*,
3. *transported* in the right way
4. to the right *laboratory*).

The guidelines must emphasize two important aspects:

1. Collection of the specimen before the administration of antimicrobial agents.
2. Prevention of contamination of the specimen with externally present organisms or normal flora of the body.

The Right Collection & Transportation of specimens

- Apply strict aseptic techniques throughout the procedure.
- Wash hands before and after the collection.
- Collect the specimen at the appropriate phase of disease.
- Make certain that the specimen is representative of the infectious process (e.g. sputum is the specimen for pneumonia and not saliva) and is adequate in quantity for the desired tests to be performed.
- Collect or place the specimen aseptically in a sterile and/or appropriate container.
- Ensure that the outside of the specimen container is clean and uncontaminated.
- Close the container tightly so that its contents do not leak during transportation.
- Label and date the container appropriately and complete the requisition form.
- Arrange for immediate transportation of the specimen to the laboratory.

Criteria for rejection of specimens

- Missing or inadequate identification.
- Insufficient quantity.
- Specimen collected in an inappropriate container.
- Contamination suspected.
- Inappropriate transport or storage.
- Unknown time delay.
- Haemolysed blood sample.

Collection of specimens

- The clinical state of the patient will not necessarily be reflected by the result of laboratory investigation despite correct laboratory performance unless the specimen is in optimal condition required for the analysis.
- Some of the important specimens and their proper collection and transportation methods are described here so as to ensure quality.

Blood

- Whole blood is required for bacteriological examination.
- Serum separated from blood is used for serological techniques.
- Skin antisepsis is extremely important at the time of collection of the sample.
- Tincture of iodine (1-2%), povidone iodine (10%) and chlorhexidine (0.5% in 70% alcohol) are ideal agents. However, some individuals may be hypersensitive to iodine present in some of these.

Collecting blood for culture

- Collect blood during the early stages of disease since the number of bacteria in blood is higher in the acute and early stages of disease.
- Collect blood during paroxysm of fever since the number of bacteria is higher at high temperatures in patients with fever.
- In the absence of antibiotic administration, 99% culture positivity can be seen with three blood cultures.
- Small children usually have higher number of bacteria in their blood as compared to adults and hence less quantity of blood needs to be collected from them.

Table 1. Volume of blood to be collected at different ages

Age	Volume in 2 bottles
< 2 years	2 ml
2-5 years	8 ml
6-10 years	12 ml
>10 years	20 ml

Cerebrospinal fluid (CSF)

- Examination of CSF is an essential step in the diagnosis of any patient with evidence of meningeal irritation or affected cerebrum.
- Almost 3-10 ml of CSF is collected and part of it is used for biochemical, immunological and microscopic examination and remaining for bacteriological or fungal examination.

The important precautions for CSF collection and transportation:

- Collect CSF before antimicrobial therapy is started.
- Collect CSF in a screw – capped sterile container and not in an injection vial with cotton plug.
- Do not delay transport and laboratory investigations.
- Transport in a transport medium if delay in processing is unavoidable.
- CSF is a precious specimen, handle it carefully and economically. It may not be possible to get a repeat specimen.
- Perform physical inspection immediately after collection and indicate findings on laboratory requisition form.
- Store at 37oC, if delay in processing is inevitable.

Table 2: Appearance and interpretations of CSF

Clear and colourless	Normal
Clear with Tyndall effect *(sparkling appearance against incident light)*	High protein content
Clear yellowish	Old haemolysis
Turbid blood-stained	Fresh haemolysis
Clear red	Haemorrhage
Turbid white	High cell or protein content
Turbid clot *(after overnight storage)*	Fibrin clots

Sputum

- Sputum is processed in the laboratory for etiological investigation of bacterial and fungal infections of the lower respiratory tract.
- It is of utmost importance in the diagnosis of pulmonary tuberculosis.

Collection of sputum

- Give the patient an additional container with laboratory serial number written on it for an early morning specimen.
- Explain to the patient to rinse his/her mouth with plain water before bringing up the sputum.
- Select a good wide-mouthed sputum container, which is preferably disposable, made of clear thin plastic, unbreakable and leak proof material.
- Give the patient a sputum container with the laboratory serial number written on it.
- Show the patient how to open and close the container and explain the importance of not rubbing off the number written on the side of the container.
- Instruct the patient to inhale deeply 2-3 times, cough up deeply from the chest and spit in the sputum container by bringing it closer to the mouth.
- Make sure the sputum sample is of good quality. A good sputum sample is thick, purulent and sufficient in amount (2-3 ml).

Urine

- Under normal circumstances urine is sterile. The lower part of the urethra and the genitalia are normally colonised by bacteria, many of which may also cause urinary tract infection. Since urine is a good growth medium for all sorts of bacteria, proper and aseptic collection assumes greater importance for this specimen.
- For microbiological examination urine must be collected as a "clean catch-mid-stream" specimen.
- Urine specimens should be transported to the laboratory within one hour for bacteriological examination, because of the continuous growth of bacteria *in vitro* thus altering the actual concentration of organisms.

Stool

- Faecal specimens for the aetiological diagnosis of acute infectious diarrhoeas should be collected in the early stage of illness and prior to treatment with antimicrobials.
- A stool specimen rather than a rectal swab is preferred.

Collection of stool

- The faeces specimen should not be contaminated with urine.
- Do not collect the specimen from bed pan.
- Collect the specimen during the early phase of the disease and as far as possible before the administration of antimicrobial agents.1 to 2 gm quantity is sufficient.
- If possible, submit more than one specimen on different days.The fresh stool specimen must be received within 1-2 hours of passage.Store at 2-8oC.
- Modified Cary and Blair medium is recommended as a good transport medium. It is a very stable medium and can be stored for use in screw – capped containers. It is a semi-solid transport medium.
- At least two swabs should be inoculated.
- Most pathogens will survive for up to 48 hours at room temperature. Specimens are unacceptable if the medium is held for more than one week or if there is detectable drying of the specimen.

Transport media of stool

- Alternative transport media are Venkataraman-Ramakrishnan medium (V-R fluid) or alkaline peptone water. VR fluid should be prepared in 30 ml (1 oz) screw capped bottles (MacCartney bottles).
- It preserves vibrios for more than six weeks and has also proved to be a very convenient medium for transportation as it can be kept at room temperature after collection of the specimen.

Throat swab

- Depress the tongue with a tongue blade.
- Swab the inflammed area of the throat, pharynx or tonsils with a sterile swab taking care to collect the pus or piece of membrane.
- Transport in sterile transport tube.

Bone marrow

- Decontaminate the skin overlying the site from where specimen is to be collected with 70% alcohol followed by 2% tincture of iodine.
- Aspirate 1 ml or more of bone marrow by sterile percutaneous aspiration.
- Collect in a sterile screw-cap tube.
- Send to laboratory immediately.

Rectal swab

- Insert swab at least 2.5 cm beyond the anal sphincter so that it enters the rectum.
- Rotate it once before withdrawing.
- Transport in Cary and Blair or other transport medium.

Transportation of specimens

- Specimens to be sent to other laboratories require special attention for safe packing of the material.
- Guidelines are usually issued by national authorities and the same should be strictly followed.
- For hand-carried transportation over a short distance, the specimen should be placed upright in appropriate racks.
- For long distance transportation, it should be placed in three containers.

For long distance transportation

- A primary container which has the specimen and is leakproof with a screw-cap.
- A secondary container which is durable, waterproof and made of metal or plastic with a screw-cap. It should have enough absorptive material to absorb the contents of the primary container should the latter break or leak. On its outside, the details of the specimen should be pasted.
- A tertiary container is usually made of wood or cardbox. It should be capable of withstanding the shocks and trauma of transportation. Dry ice can be kept between this and the secondary container along with sufficient absorbents and provision for the escape of carbondioxide to prevent a pressure build-up inside (Fig 1).

General precaution

- Most specimens should be processed in the laboratory within 1 to 2 hours after collection.
- In practice, a 2-to 4-hour time limit is probably more practical during a normal working day.
- The laboratory must be organized to permit processing of the specimens as soon as they arrive, and the collection of most specimens should be limited to the working hours of the laboratory.
- Some arrangements must be made to allow for the initial handling of the few specimens that have to be collected outside of the laboratory's working hours.

General Precaution

- A continuous effort must be made in order to ensure proper collection and transportation of clinical specimens.
- Full cooperation of nursing staff and others concerned with specimen collection is required and can be achieved once they are made aware of the principles involved and the significance of what they are being asked to do.

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