

## Review Article

## An Update: Microbiology Specimen Collection and Transport

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**Abstract:** Almost nothing is more important to the effectiveness of a laboratory than a specimen that has been appropriately selected, collected, and transported. If these are not a priority, the laboratory can contribute little or nothing to patient care. Specimens should be rejected if there is a risk to the safety of a patient; i.e. occasions where there is concern for the identity of the specimen, the wrong container type, incorrect transport conditions, etc. However, it is always important to double check if a specimen could be accepted. This may involve processing the specimen so as not to compromise specimen integrity while also evaluating the specimen for acceptability. In this review article, we will cover specimen collection, specimen transportation, culture, and rejection by the laboratory.

**Keywords:** Specimen, Collection and Transport, the laboratory.

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### INTRODUCTION

The goal of microbiologic evaluation is to provide accurate, clinically pertinent results in a timely manner. The quality of the specimens submitted to the microbiology laboratory is critical for optimal specimen evaluation.

The Valid interpretation of the results of culture can be achieved only if the specimen obtained is appropriate for processing. As a result, care must be taken to collect only those specimens that may yield pathogens, rather than colonizing flora or contaminants. The requesting clinician can help to ensure that the specimens are processed appropriately by completing requisitions accurately and by providing the laboratory with as much relevant information as possible. Generally, specimens may be sent to the microbiology laboratory in sterile, leak-proof containers enclosed within leak-proof, sealed plastic bags. Prompt transport of specimens to the microbiology laboratory is essential in order to optimize the yield of cultures and the interpretation of results. Delays in processing may result in the overgrowth of some microorganisms or the death of more fastidious ones. Desiccation of the sample must also be avoided.

### SPECIMEN COLLECTION

Valid interpretation of the results of culture can be achieved only if the specimen obtained is appropriate for processing. As a result, care must be taken to collect only those specimens that may yield pathogens, rather than colonizing flora or contaminants. Specific rules for the collection of material vary, depending upon the source of the specimen, but several general principles apply [1-3]:

- Before collecting the specimen, consider the risk/benefit ratio of the collection procedure to the patient.
- Inadequate and/or inappropriately collected specimens for culture yield little useful clinical information and may actually be misleading.
- Inform the clinical microbiology lab when “rule-out” requests are important. Consider geographic location.
- Season when notifying the laboratory of “rule-out” requests.
- Collect specimen before administering antimicrobial agents when possible.
- Make every effort to obtain specimens prior to the initiation of antimicrobial therapy.

- Wear gloves, gowns, masks, and/or goggles, when appropriate, when collecting specimens from sterile sites. Use strict aseptic technique.
- When obtaining specimens from normally sterile sites such as pleural or joint spaces, CSF, or the peritoneum, take care to minimize contamination by the normal colonizing flora of the skin or mucous membranes.
- Collect an adequate volume of specimen; send tissue or fluid whenever possible rather than submitting a specimen collected on a swab.
- If the specimen is collected in a syringe, remove the needle and replace it with a cap prior to transport.
- Label all specimen containers with identifying information about the patient (name and hospital number or birth date) and the specimen source and date and time of collection.
- Complete all paper or electronic requisitions completely and precisely, including requested details on patient history, antimicrobial therapy, and specimen source, so that the laboratory can best determine the appropriate method for processing the specimen.
- Notify the laboratory in advance if special tests are requested or if unusual pathogens, including potential agents of bioterrorism, are suspected.
- Place warning labels on specimens from patients suspected of having highly contagious diseases and notify the laboratory supervisor.
- Coordinate the processing of specimens which are being submitted for both microbiologic and pathologic evaluations. It is often better to send a single specimen to the laboratory, and to have it divided there by an experienced pathologist, rather than submitting separate specimens. If a single sample is submitted, it must not be placed in the preservatives routinely used for pathology specimens (eg, formalin) until a portion is separated for culture.
- If there is any question about the optimal sample to collect, call the microbiology laboratory before obtaining specimens.

## **SPECIMEN TRANSPORT**

In general, specimens may be sent to the microbiology laboratory in sterile, leak-proof containers enclosed within leak-proof, sealed plastic bags. In the case of fluids obtained in syringes (eg, paracentesis, joint aspirate, needle drainage of abscess), most organisms remain viable for significant periods of time in the syringe used for collection. It has long been advocated that these specimens be sent in the original syringe. However, in the era of universal precautions, some laboratories encourage transfer of the material to another container prior to transport, while others recommend transport in the original syringe after the needle is removed and replaced with a cap. In our institution, the microbiology laboratory prefers to

receive specimens in the original syringe, as long as the needle has been replaced with a cap. The laboratory will also accept specimens in other containers but will reject any syringe that arrives with the needle still in place.

Prompt transport of specimens to the microbiology laboratory is essential in order to optimize the yield of cultures and the interpretation of results. Delays in processing may result in the overgrowth of some microorganisms or the death of more fastidious ones. Desiccation of the sample must also be avoided.

Samples for bacterial culture should ideally arrive in the microbiology laboratory within one to two hours of collection. If a delay is unavoidable, most specimens (with the exception of blood, cerebrospinal fluid, joint fluid, and cultures for *Neisseria gonorrhoeae*) should be refrigerated until transported. It is important to add that refrigeration should occur in a refrigerator approved for specimen collection.

All specimens should be delivered as soon as possible to the Clinical Microbiology Laboratory. Safety Considerations for Collection and Transport of Specimens

1. Follow universal precaution guidelines. Treat all specimens as potentially hazardous.
2. Personnel must use appropriate barrier protection (such as gloves and laboratory coat or gown) when collecting or handling specimens. If splashing may occur, protective eyewear, face masks, and impervious aprons are also necessary.
3. Do not contaminate the external surface of the collection container and/or its accompanying paperwork.
4. Minimize direct handling of specimens in transit from the patient to the laboratory whenever possible. Use plastic sealable bags with a separate pouch for the laboratory requisition orders or transport carriers.
5. Never transport syringes with needles to the laboratory. Instead, transfer the contents to a sterile tube or cup, or remove the needle, recap the syringe and place the syringe in a sealable, leak proof plastic bag.

## **SPECIMEN REJECTION BY THE LABORATORY**

Some of the common reasons for rejection of specimens by microbiology laboratories include:

- Unlabeled specimens
- Inconsistent information on the requisition and the specimen label (eg, different patient names)
- Specimen received in a leaking or broken container
- Specimen obviously contaminated
- Inappropriate test request based upon the source of the specimen or clinical situation (eg, request for a stool culture for enteric pathogens in a patient hospitalized for more than three days)

- Inappropriate transport medium for the requested test (eg, anaerobic cultures requested for specimen submitted in aerobic transport media)
- Insufficient quantity of specimen.
- Specimen transported at an inappropriate temperature.
- Prolonged specimen transport time,

It is important that the microbiology laboratory notify the responsible physician promptly when a specimen is rejected, so that appropriate measures can be taken to obtain more material. If there is a labeling problem, the person responsible for collecting the specimen may be able to rectify the paperwork error. In situations in which obtaining another specimen is not feasible (eg, surgical or other invasive procedure required to obtain the original specimen), the laboratory may have to proceed with specimen processing, even though the validity of the results may be compromised. Such decisions typically are made in collaboration with the patient's physician, and laboratory reports usually are accompanied by a disclaimer.

Examples of specimens which are unsuitable for culture include [4-5]:

- Swabs of decubitus ulcer, perirectal abscess, periodontal lesion, burn wound, and gangrenous ulcer - submit aspirate or tissue instead.

- Vomitus.
- Colostomy discharge.
- Foley catheter tip.

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