

- **Patient identification**—The person collecting the sample must accurately identify the patient. This might be done by questioning the patient, by questioning an accompanying family member, or by the use of an identifying wrist band or other device.
- **Type of sample required**—Blood tests might require serum, plasma or whole blood. Other tests might require urine or saliva. Microbiology testing deals with a variety of sample types, so specific information as to what is required for the test is needed.
- **Type of container**—The container for the sample is often very important, as it will affect volume and any needed additives such as anticoagulants and preservatives. If the container does not control volume, for example as with Vacutainer® tubes, this will need to be clearly specified. Some microbiology samples will require specific transport media to preserve microorganisms.
- **Sample labelling**—All requirements for labelling of the sample at the time of collection will need to be explained in detail in the instructions for collection.
- **Special handling**—Some samples may require special handling, such as immediate refrigeration, protection from light or prompt delivery to the laboratory. Any important safety precautions should be explained.

Patient samples are sometimes collected by the patient themselves; for example, faecal parasitological samples. It is important that the laboratories have set protocols to ensure that appropriate collection kits with instructions for collection, safety precautions and labelling are available for their patients. It is suggested that instructions for the patients be in the languages for the community the laboratory is serving, or presented as simple, easy-to-understand graphics.

Sample labelling

Each sample should be clearly labelled with:

- the patient's first and last name;
- a unique identification number—this might be a hospital number or a number assigned by the laboratory;
- the test that has been requested;
- the time and date of collection;
- the initials of the person collecting the sample.

Outcomes of collection errors

Proper sample collection is an important element for good laboratory practice. Improper collection of samples can lead to poor outcomes, such as:

- delays in reporting test results
- unnecessary redraws/retests
- decreased customer satisfaction
- increased costs
- incorrect diagnosis or treatment
- injury
- death.

5-6: Sample transport

Need for transport

Frequently, samples are collected outside the laboratory and must be transported for subsequent processing and testing. Transport may be for a short distance, but sometimes a distant clinic or collection site requires the use of vehicles or aeroplanes. In addition, it may be necessary for the laboratory to ship samples to referral laboratories. In all cases, transport must be managed carefully in order to maintain integrity of the sample, giving attention to temperature, preservation needs, special transport containers and time limitations. It is also important to ensure the safety of those handling the material before, during and after transport.

Safety requirements

Laboratories that mail or transport samples by air, sea, rail or road between local, regional and reference laboratories, or between laboratories in other countries, must adhere to a number of regulations. These regulations are designed to deal with transportation accidents and spills, reduce biohazards and keep samples intact for testing.

Regulations

Regulations for transporting samples come from several sources, including:

- national transport regulations;
- International Civil Aviation Organization (ICAO), as conveyed by the International Air Transport Association;
- rail and road traffic agencies;
- postal services.

Private courier companies may have their own requirements.

Compliance with industry standards and regulations is mandatory. Heavy fines may be imposed on personnel who violate these regulations. At risk are the safety of courier, carrier and laboratory personnel, as well as passengers.

The United Nations committee of experts, consisting of voting representatives from over 30 countries and nonvoting advisers from various organizations, makes recommendations for the transport of dangerous goods. Many countries adopt the United Nations regulations in their entirety to stand as their national dangerous goods regulations. Some countries apply variations. National authorities should provide details of their own national requirements.

Classification

Sample transport requirements are based on the category of samples being transported. Infectious substances are classified as Category A or Category B. There is no direct relationship between Risk Groups and Categories A and B.

Category A: Infectious substances capable of causing permanent disability or life-threatening or fatal disease to humans or animals.

Packaging requirements

These are assigned the following proper shipping name and UN number:

- Infectious substance affecting humans, UN 2814.
- Infectious substance affecting animals only, UN 2900.

Category B: Infectious substances that do not meet the criteria for inclusion in Category A. They are assigned the proper shipping name Biological substance, Category B, and UN number UN 3373.

Medical or clinical wastes that contain infectious substances also need to be classified as Category A or B, depending on the infectious material and whether it is present in the culture.

Exemptions: The United Nations Model Regulations for the Transport of Infectious Substances includes a list of exemptions, which are samples that have a minimal likelihood that pathogens are present. They do not have the same requirements for packaging and shipping as Categories A and B.

All three categories of samples have specific packaging instructions and labelling requirements depending on their classification. All potentially hazardous material requires triple packaging.

- The **primary container** is a tube or vial containing the sample; it is made of glass, metal or plastic. It must have a leak-proof seal; if necessary it can be wrapped with waterproof tape. The tube or vial must be labelled with a permanent marker.
- The **secondary container** is a watertight polyethylene box intended to protect the primary container. It is supplied with cardboard or bubble-wrap, or a vial holder in which several primary containers can be placed in order to protect them. Absorbent material (gauze, absorbent paper) must be added in a sufficient quantity to absorb the fluid completely in case of breakage.
- The **outer container** is a strengthened cardboard box used to protect the secondary container. Both the secondary and outer containers are reusable as long as they are intact, but old labels must be removed.

There is specific packaging for samples requiring shipment on dry ice.

Managing sample transport

Ensure that all regulations and requirements are met when transporting samples; be aware of any national requirements that apply to samples transported by hospital or laboratory vehicles.

All personnel who package samples or who drive transport vehicles should be trained in the proper procedures for safety and good maintenance of samples. If ICAO regulations must be met, staff must have specific training in packaging of dangerous goods.

When transporting locally, whether by ambulance, or by clinic or laboratory staff, it is important to maintain sample integrity. Ensure that temperatures are controlled, using ice boxes or air-conditioning, set an acceptable transport time and monitor compliance.