

# Guidelines: Relevance of Infectious Diseases for Electroencephalogram and Other Neurophysiology Laboratories

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Public health issues have arisen because of the devastating impact of infectious diseases on the human population in general and on specific health care providers in particular. These developments have resulted in recommended guidelines for handling materials from such patients, both in vivo, and post-mortem. As such, there is concern to publish guidelines for handling patients with infectious diseases during electroencephalographic recording and other neurophysiologic studies. The electroencephalogram (EEG) as well as other neurophysiologic diagnostic tests may be considered an integral part of clinical assessment of patients with various illnesses, and specifically, various infectious diseases. The EEG, in fact, may become diagnostic and even pathognomonic for such infectious diseases as Creutzfeldt-Jacob disease (CJD), subacute sclerosing panencephalitis (SSPE), and herpes simplex encephalitis (HSE). The EEG is useful in diagnosing patients who have dementing illness, encephalopathies of various types, and seizure disorders. All of these conditions may have an underlying infectious disease etiology. More recently a number of studies have been published suggesting that the EEG may be useful in the evaluation of potential human immunodeficiency virus (HIV) patients. Generally, infection may be transmitted by various routes. For example, through the air, through contact with a common vehicle such as food or water, or even a vector which may be a flea, louse, or mosquito.

In the EEG laboratory, a major concern is to prevent contact and airborne transmission of any infection. Of course, this kind of transmission may go from staff members or electroencephalographers to the patient, and vice versa. Simple contact transmission may occur from inadequate handling of equipment, or poor basic cleaning of electrodes or equipment. Air-

borne transmission may be secondary to an unclean laboratory, poor ventilation, and unsanitary handling of patients by staff members. Common sense practices such as not coughing on the patient or having the patient turn away when coughing, are to be recommended.

Transmission of infection during a routine neurophysiologic study, for example, EEG recording, is virtually unheard of except for depth electrode placement in patients with CJD which is a form of subacute spongiform encephalopathy caused by an unconventional viral-like particle.

The broad scope of infectious diseases comprises such organisms as, for example, bacterial pathogens such as *Neisseria meningitidis* and *Haemophilus influenzae*, anaerobic infections, infections due to *treponema*, for example syphilis, mycobacterial and mycotic infections, rickettsial disease, mycoplasma, chlamydia, latent viral-like infections such as CJD, retrovirus disease, parasitic infection, for example, protozoan and helminthic infections. Viral pathogens include HIV, Epstein-Barr virus and hepatitis B.

The purpose of this report is to be brief overall, specific in detail, and general in application as it applies to regular EEG and neurophysiologic laboratories. In the future, it is anticipated that these guidelines will most likely have to be altered and updated as new information becomes available and knowledge regarding etiology is incorporated into general medicine. Most certainly, new infections and novel infectious agents will be recognized to be either causal or involved in various human diseases and diseases of the central nervous system

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which will be important and relevant to the EEG laboratory.

For the purposes of this report, the following specific diseases are of concern: (1) acquired immune deficiency syndrome; (2) forms of viral hepatitis, and (3) diseases caused by latent viral-like particles.

As a general principle, all staff members of an EEG laboratory or general neurophysiological laboratory including EEG technologists and directors of EEG laboratories or electroencephalographers should be aware and become knowledgeable about certain infectious diseases. Some common sense ideas about control of infectious disease transmission, epidemiology, and disinfection principles should be known. The suspected diagnosis of the patient coming to the EEG laboratory may be on the medical records or medical request form, if, however, further information is necessary regarding possible infection or if an infectious disease is suspected in a patient by the laboratory technologist, a quick telephone call to the referring physician or a discussion with the EEG laboratory director may clarify the procedure to be followed. Then the necessary sterile techniques or isolation procedures should be followed. Even if infection is suspected, but unconfirmed, the laboratory staff should assume that the suspected infection is definite rather than ignoring it. Special care and vigilance is recommended and all precautionary measures should be taken.

Knowledge of the following procedures may be important:

1. Enteric precautions preventing spread of infection from contamination with urine and feces.
2. Respiratory precautions preventing spread of infection from contamination of air or dust with secretions.
3. Blood precautions preventing spread of infection from contamination with infected blood or blood products, prevention of accidental puncture with a needle that has been used in a patient with infectious disease.
4. Wound and skin precautions preventing spread of infection from contact with infected wound or skin.
5. Strict isolation: this is undertaken when increased virulence and great communicability of the infecting agent is suspected.

6. Protective isolation: this is to protect the patient who has an abnormal immune mechanism or is an immune compromised host.

To achieve the above, the following procedures may be used in various combinations: (a) wearing a gown; (b) wearing a mask; (c) wearing gloves; (d) hand washing; (e) cleaning of equipment and supplies; and (f) cleaning of the laboratory floor and other horizontal surfaces.

Cleaning the equipment including EEG machine, related equipment, and disk electrodes requires a common sense approach and general hygiene measures suggested to maintain the laboratory in a clean and sanitary condition. The EEG machine should be wiped with 70-90% ethyl alcohol or isopropyl alcohol, phenol, or other noncorrosive disinfectant after use on a patient with an infectious disease. EEG equipment can be handled and cleaned in a similar way when routine infection is suspected. When the EEG machine is contaminated with secretions or blood, it should be wiped with 5% hypochloride solution.

Needle electrodes are rarely used in 1989 and definitely should not be used in patients who are suspected of having a contagious infectious disease. In any patient who has dementia of uncertain etiology, needle electrodes should not be used. Disk electrodes may expose the EEG technologist to direct contact with infected patients. Rubber gloves are recommended when placing electrodes on patients with suspected or known infectious disease. Two pairs of gloves may be used for extra protection. Special care should be taken in handling patients with CJD, AIDS, hepatitis, and obvious skin infections. In these patients, scratching or abrasion of the scalp should be avoided because blood or secretions in the scalp may be potentially infectious. If abrasion with blunted needles is necessary, the blunted needles used for conductive jelly should be treated the same as disk electrodes, but those used for scratching and abrading should be bagged, autoclaved, and discarded along with other contaminated biohazardous materials. Special arrangements need to be made in advance with a company or organization that is registered or licensed to handle such contaminated material. For all types of infectious disease, disk electrodes should be first cleaned with gauze, tap water, or ideally with a mechanical "ultrasonic cleaner" to remove particulate matter. They should then be