
Disposable versus reusable electrodes used for neurophysiological examinations

INTRODUCTION

A literature search for documentation on the use of disposable surface and needle electrodes for neurophysiological examinations, especially regarding infection risk, was conducted through Medline and Google. The extent of literature on the risk of infection in connection with the use of surface electrodes was very limited. More documentation was available for needle electrodes. No useful documentation was found on disposable cup electrodes in general.

CLASSIFICATION OF ELECTRODES

According to a classification scheme widely adopted for infection control, electrodes and other devices can be classified as noncritical, semicritical or critical.

The lowest risk is associated with noncritical devices i.e. those that come in contact with intact skin but not mucous membranes and so are thought to rarely, if ever, transmit disease. Surface electrodes belong to this category, if they are applied to non-abraded and otherwise intact skin.

Semicritical devices are those electrodes that come in contact with mucous membranes or with skin that is not intact. This means that surface electrodes come under this classification, when they are applied to skin that has been purposely abraded (e.g. skin- prep or use of a blunt needle) or is not intact for other reasons, including cuts, scratches, chapping, or diseases of the skin.

The highest risk of disease transmission is that associated with critical devices, i.e. those that enter sterile tissue or the vascular system such as needle electrodes.



GUIDELINES AND CLINICAL RECOMMENDATIONS

Most of the documentation found is focusing on recommendations of how to clean and disinfect electrodes.

NONCRITICAL SURFACE ELECTRODES

Some authors recommend that noncritical reusable electrodes be cleaned before reuse¹, but do not require disinfection, while others recommend low-level disinfectants².

SEMICRITICAL SURFACE ELECTRODES

For the semicritical electrodes high-level disinfection is recommended by the guidelines, as they should be free of all microorganisms to prevent disease transmission. A study from 1997⁴ detected the presence of blood on EEG surface electrodes on 1.2% of these electrodes (before disinfection).

The electrodes were from sites at which both abrasive skin prep and a blunt needle had been used and from sites where only abrasive skin prep was used.

The safest approach to reduction of the risk of inadequate disinfection and thus risk of cross infection is of course to use disposable electrodes.

CRITICAL ELECTRODES

Needle electrodes must always be sterile at the time of use and reusable electrodes thus require sterilisation to avoid contamination with any microorganism including bacterial spores. Several guidelines however recommend the use of disposable needle electrodes:

- In a review and update on infection control for electro-neurodiagnostic technologists published in the American Journal of Electroneurodiagnostic Technologists in 2003⁵ they recommend the use of disposable needle electrodes whenever possible. Moreover, they recommend that if reusables are used, they should only be sterilised if the cost to sterilise them is less than the cost to replace them.
- In the same journal the International Organisation of Societies for Electrophysiological Technology (OSET) published guidelines in 1999 for infection control in the clinical neurophysiology department. These guidelines state that single use disposable needles should be the product of choice, because they are safer and less expensive than re-usable needles when the costs for sterilisation are taken into account.
- In an invited review in the journal Muscle Nerve from 2003⁶ concerning complications and risks of nerve conduction studies and needle electromyography, the authors state that disposable needle electrodes should always be used.
- In a research article published in the journal of the Canadian Medical Association in 2007 an outbreak of hepatitis B associated with reusable subdermal electroencephalogram electrodes were reported. A technician, who turned out to be positive for hepatitis

B, had been using reusable subdermal EEG electrodes. According to the technician the electrodes were cleaned using brushes and cleaning solutions including hypochlorite and subsequently subjected to dry-heat sterilisation. Obviously infection control procedures were inadequate.

USE IN HIGH-RISK PATIENTS

For high-risk patients such as patients suffering from Creutzfeldt-Jakob Disease (CJD), hepatitis or AIDS, special precautions must be observed. If needle electrodes are to be used it is imperative, according to infection control guidelines, that they are of the disposable kind^{3-5,8}. For surface electrodes the OSET guidelines⁵ recommend the use of disposable electrodes.

CONCLUSION

No official guidelines or clinical studies recommending the use of disposable surface electrodes to minimise the risk of infection in non high-risk patients were found. However, an argument for use of disposable surface electrodes could be that one seldom knows whether a patient is a high-risk patient or not and OSET recommends disposable surface electrodes for high-risk patients. So to be absolutely sure not to transfer microorganisms from abraded skin via insufficiently disinfected electrodes, use disposables.

Several guidelines, however, strongly recommend the use of disposable needle electrodes, the reason being the risk of crossinfection.

In conclusion, the best arguments concerning electrodes and infection control are the guidelines (although only American).

Concerning general arguments (e.g. handling, costs) for the advantage of using disposable instead of reusable electrodes, no supportive literature was found.

REFERENCES

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