

Electrical safety on a haemodialysis unit.

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Background

Electro Static Discharge can lead to life threatening situations for patients and staff. In the early 70's at least 1000 cases per year of micro-shocks in hospitals were counted. Safety measurements changed but the risk still remains. So it is important to keep this invisible, inaudible and often not perceptible spark under control. To do that, all our treatment locations are electrically classified Group 2 (IEC 60364-7-710) and all medical equipment is checked for leakage current hazards.

Leakage currents are unwanted AC/DC currents that flow in a device to the grounded enclosure or through any conductive part that is connected to the ground. If the equipment is not properly grounded, the current flows through other paths such as the human body. The leakage currents can stimulate nerves or muscles; can cause burns, damaged tissue, cardiac arrest and ventricle fibrillation. The publication of the International Electro-technical Commission standards **IEC 60601** (1977) and **IEC 62353** (2007) force the manufacturer to produce, and the user to maintain, safe medical devices.

The degree of protection is defined by the equipment type; type B, BF, CF. Type B equipment (dialysis machines) provide protection by connecting all conductive parts to the protective earth. Type BF equipment adds an isolated applied part for patient connections, CF is like BF but the patient applied part is provided with a higher degree of insulation and is suitable for direct cardiac application,

What on a haemodialysis unit?

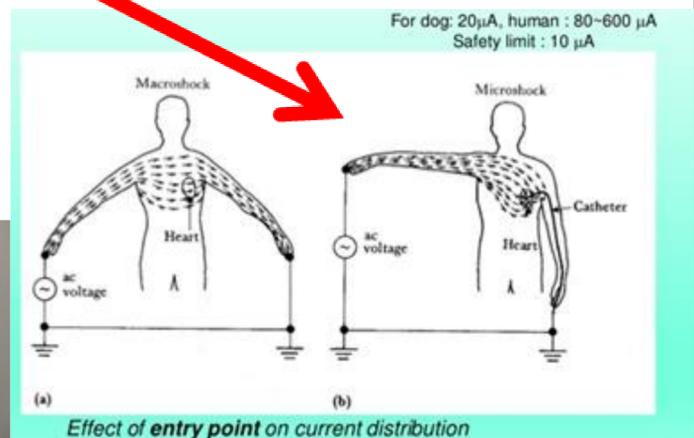
Inside dialysis machines (Class I type B) the dialysate heater is connected to the mains without protection transformer.

When central dialysis catheters are used for access, with their tip close to or within the right atrium of the heart, there is an electrical contact with the heart. During dialysis treatment an electrical leakage current may occur to the dialyzer if there is a broken ground (first fault condition) or a fault in another electrical **Class I** device connected to the patient.

In the dialysis unit classified "G2" we have to connect the yellow/green cables of machines, beds to their dedicated outlets. This potential equalization System prevents the occurrence of a leakage current from these devices.

Types of Equipment

The degree of protection for medical electrical equipment is defined by the type designation.



Conclusions/Applications for nurses.

It is the doctors' responsibility and the nurses' duty to control the connection and state of these potential equalization yellow/green and mains cables of beds, hemodialysis machines and other equipment. The technicians and reference nurse of our unit continuously try to implement this control habit to all the new doctors, nurses and logistical personnel.

Only with regularly monitored equipment and installations, dialysis is considered to be a relatively safe procedure as far as electrical hazards are concerned.

