Earthing dialysing locations where central venous catheters may be used

With regards to leakage current and dialysis equipment, as circulated in a previous alert (December 2010), the MHRA have contacted all dialysis machine manufacturers with advice on safety information for manufacturers to consider. It must be emphasised that no definite incidents attributable to this have been reported, but it is a theoretical risk for sudden death on dialysis.

“The MHRA has been made aware that, where dialysis is performed via a central venous catheter, special attention must be paid to the earthing and bonding of the dialysis equipment to ensure that patient leakage current via the catheter is less than 10μA. Leakage currents in excess of 10μA may induce ventricular fibrillation in the patient. In medical equipment that requires an earth connection any leakage current is taken to ground via the earth conductor in the mains cable. If this conductor becomes disconnected, the leakage current will flow through the dialysate lines and dialyser to the central venous catheter and then to ground via any earthed surface in contact with the patient or through the waste dialysate drain. A concentration of electrical current at the catheter tip could exceed the level that would induce VF. In addition, a voltage difference between the dialysis machine earth and the earths of other electrical devices near the patient, including the waste dialysate earth, may also pose a risk of shock.

The MHRA believes that the relevant safety information should be contained in the manufacturer’s instructions for use and installation guidance for dialysis equipment. The MHRA is concerned that there may be manufacturers who are not aware of this issue and we are writing to you as we understand that your company manufactures and supplies dialysis machines. As a general guide the MHRA would expect the following point to be contained within your instructions for use.

Supplementary Earthing
To reduce the risk of ventricular fibrillation users must ensure that the machine’s equipotential point is connected to the dialysis suite’s earth reference bar (ERB) when central venous catheters are being used during haemodialysis or haemofiltration. You may wish to add any additional earthing requirements for your equipment.”

MHRA are also continuing to liaise with all dialysis machine manufacturers to review adequacy of the machines and their earthing connections. With regard to the set up of renal units, the Department of Health's Facilities & Estates (F&E) department have been made aware of MHRA’s concerns regarding this issue, as F&E were involved in the earlier stages of our investigation. For your reference, if you require more information on earth reference bars you may refer to sections 5 and 6 of the MEIGaN document, which can be downloaded from:-


It should be noted that the MEIGaN document is intended primarily for imaging locations, which will often call for high current three phase supplies, and is not applicable to dialysis rooms. However, the sections on earthing are generally applicable to all medical equipment.

Please submit comments, solutions, and personal experience to:
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