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Electronic control device prongs: a growing cause of bloodborne pathogen exposure?

To the Editor:

Electronic control devices (ECDs) are now being used by many law enforcement agencies as nonlethal means to subdue individuals. The devices fire 2 small dart-like probes into a target individual that attach through the skin with a fishhook-like prong and remain attached to the weapon to deliver an electronic shock to disrupt voluntary muscle control. For the first time in our reported sharps exposure history, 2 separate BBP exposures involving ECD probes were reported at our medical center in the months of April and May of 2015. The first involved a staff member in our medical center's emergency department (ED) and the second concerned a law enforcement officer.

CASE 1

An ED clinical staff member was taking the vital signs of a patient who was subdued using an ECD. The ECD probe was still embedded in the patient's soft tissue of their chest wall. The patient moved, causing the probe to dislodge and the prong tip punctured the staff member's palmer surface of their right hand. The staff member received treatment, including BBP exposure treatment, per our protocol.

CASE 2

A law enforcement officer suffered an abrasion and puncture wound because of an ECD probe prong after it was removed from a man who was later brought to our ED. The Massachusetts Department of Public Health mandates the health care facility that receives individuals who are the source patient for an unprotected exposure provide testing for HIV (with consent) and hepatitis B and C. In addition, the exposed provider is offered medical care, follow-up, and counseling.

Discussion with local law enforcement agencies determined that there has been increased use of ECDs and that at least 1 additional local law enforcement agency was anticipating to further increase their use of these devices.

In follow-up to these 2 events, an alert memo was sent to all staff working in the medical center's 2 EDs and to affiliate EDs outlining the following reminders and guidelines:

- ECD probe prongs represent a sharp exposure risk.
- Ensure the cooperation of the patient so not to put yourself, staff, or the patient at risk of injury.
- An instrument, such as a hemostat, should be used to remove ECD probes attached to a patient (and do not directly remove them by hand).
- Dispose of ECD probes in an approved, hard-sided sharps container.
- If there is an exposure, it should be treated the same as any bloodborne fluid exposure.

Because the electric shock delivered by an ECD can potentially cause the subdued individual to fall or induce cardiac arrhythmias, it is likely that EDs will see an increasing number of patients presenting after they have been subdued by these devices.[1-3] Institutions should consider educating staff as to the sharp injuries risk associated with them and implementing procedures to reduce the risk.

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Pitfalls of cleaning controls in ultrasonic washers

To the Editor:

Many published data underline the need to clean critical medical devices properly, and Evangelista et al have recently confirmed some of the pitfalls of using automatic washing.[1,2] In particular, ultrasonic washing is highly variable in terms of residual protein levels on dental instruments and leads to an approximately 21% reduction in the average microbial load of gastrointestinal surgical instruments.[1,2] We agree with the crucial warning from Evangelista et al: "The use of cleaning equipment and solutions must be appropriate, and their inadequate manipulation by users might affect the quality of cleaning, the possibility of relapse, and adverse events related to the use of processed products."[1]

A subjective assessment of solution turbidity, the use of cleaning indicators, and the visual inspection of cleaned medical devices are the main means of checking the cleaning efficacy of validated automated washers indicated in the regulations for the decontamination of dental medical devices.[3,4]

We here describe our experience of verifying the efficacy of the ultrasonic washers (UWs) and washer-disinfectors (WDs) in our dental offices. We used the Browne STF Load Check Indicator (Albert Browne International Ltd, Leicester, UK), which is claimed to be equivalent to the cleaning efficacy soil test and appropriate for checking both types of equipment in accordance with ISO/TS 15883-05-2005.[5] Although its detailed composition is unknown, the lipid and polysaccharide protein-containing red glue deposited on the polymer-structured thin film is not hazardous for dental workers or devices. Red glue product release in UWs is acceptable for subsequent medical device cleaning, whereas the aluminum particles released from damaged foil during the aluminum foil test (the reference test mainly used by UW manufacturers) are not.[4]

We first confirmed that the STF works properly in a Miele G7881 automatic WD (93°C, 10-minute cycle using Neodisher; Miele & Cie, Gutersloh, Denmark),[6] but to our knowledge, there is only 1 article evaluating cleaning indicators in UWs.[7] We therefore decided to use the STF to check the cleaning efficacy of a UW (Eurosonic 4D, 3,4L; Euronda, Montecchio Precalcino (VI) Italy), which works in sweep mode at the frequency of 32-35 kHz at a power of 100 W. After selecting a 10-minute cycle at 30°C to avoid the possible degradation of product components (mainly disinfectants and enzymes) and the precipitation of proteins on medical devices, the STF was inserted in its holder and placed vertically in the middle of the basket of the UW for all of the experiments.[3-5] All of the chosen products used (Metrizyme Kerr, Orange, CA; Enzymax Earth Hu-Friedy, Mfg. Co., Tuttlingen, DE; ID 212 Strong Durr, Orochemie gmbH+ Co., KG, Kornwesthein, Denmark; and Z1 Ultra Zhermack SpA, Badia Polesine, Italy) were declared to be compatible with UWs and were freshly prepared by diluting them with purified water as instructed by the manufacturers (used concentration: Metrizyme [1%]; Enzymax Earth [0,8%]; ID212 Strong [2%]; Z1 Ultra [1%]). A first cycle was run to achieve a temperature of 30°C and remove gas bubbles from all of the solutions and purified water (used as a negative control).

Under the same UW operating conditions, the STF gave the same results when using Enzymax Earth and Metrizyme: at the end of the cycles, there were no red residue on the film, and the presence of a red transparent liquid indicated complete red glue release by the enzymes and detergents in the products. However, ID 212 Strong and Z1 Ultra left unacceptable red residues (>2% of the soil) on the STF. The presence of a cloudy red solution (normally attributed to protein denaturation) indicated some drawbacks when the STF is used to check the cleaning efficacy of disinfectants based on quaternary ammonium compounds (QACs), whereas QAC solutions alone remain transparent. We think that the failure was caused by the strong alkaline pH (10-11) of ID 212 Strong and Z1 Ultra (Enzymax Earth and Metrizyme have an acid pH of 6-6.5) and increased adhesion of the red glue as a result of some of the product components. It is known that other cleaning indicators have more failures at 40°C than at 60°C in WDs,[6] but in UWs, 60°C impairs QACs (see the stringent temperature ranges indicated in the manufacturer's instructions),[8,9] enzymes, and protein stability, therefore causing protein precipitation; in addition, at 60°C, occupational hazards caused by product evaporation cannot be excluded.[3]

Our evidence suggests that care should be taken when using the STF in UWs (particularly in the presence of QAC disinfectants) and that the stability of the cleaning products (in relation to the number of UW cycles and loads),[10] which is not indicated by the manufacturers, should be borne in mind. We therefore agree with Evangelista's warning concerning the absolute need for strict guidelines and well-designed protocols based on clear information from manufacturers, appropriate solutions and test soils, and properly operating UWs.

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