Electrostatic discharges and their effect on the validity of registered values in intracranial pressure monitors

Object Intracranial pressure (ICP) monitoring is used extensively in clinical practice, and as such, the accuracy of registered ICP values is paramount. Clinical observations of nonphysiological changes in ICP have called into question the accuracy of registered ICP values. Subsequently, the authors have tried to determine if the ICP monitors from major manufacturers were affected by electrostatic discharges (ESDs), if the changes were permanent or transient in nature, and if the changes were modified by the addition of different electrical appliances normally used in the neurointensive care unit environment. Methods The authors established a test setup in the neurointensive care unit using a large container filled with isotonic saline, creating a phantom patient. Intracranial pressure monitors were sequentially lowered into the container and subjected to a predefined test battery of ESDs. Results Five pressure monitors from 4 manufacturers were evaluated. Three monitors containing electrical circuitry at the tip of the transducer were all affected by ESDs. Clinically significant permanent changes in the reported ICP values for 1 pressure monitor were observed, as well as temporary deflections for 2 other monitors. The monitors had different levels of sensitivity to discharges at low voltages. Conclusions These results explain some of the sudden shifts in ICP noted in the clinical setting. However, a clear deflection pattern related to the addition of electrical appliances was not found. The authors recommend instituting policies for reducing the risk of subjecting patients to ESDs in the neurointensive care unit setting.