

Reducing endotoxin from dialysis water by using different disinfection processes

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ABSTRACT

Hemodialysis centers in Baghdad show elevated concentrations of endotoxin. This reflects the inefficient treatment process used to purify dialysis water. The objective of this research is to evaluate several treatment processes to inactivate endotoxin concentration in dialysis water. The studied treatment options include utilizing ultrafiltration membrane (UF), disinfection with ozone (O₃), and disinfection with hydrogen peroxide (H₂O₂). Hybrid treatment was also considered by joining two or more of the above treatment methods. A lab-scale unit was built to implement the experiments and synthetic water (feed solution) was prepared with a known value of endotoxin concentration (0.48 EU/ml). Limulus amoebocyte lysate test was used to determine endotoxin concentrations in the treated water. The results showed that all the tested treatment methods resulted in reducing the levels of endotoxins and providing high purity dialysis water. However, the best treatment was achieved when using triple treatment (i.e. UF, O₃, and H₂O₂). This combination reduced endotoxin concentration using the minimum feed of H₂O₂ at a significantly short contact time for oxidation agents (i.e., O₃ and H₂O₂). Accordingly, it is important to change the design of the currently used water treatment units in Baghdad to produce dialysis water in compliance with the international dialysis water quality standards and save patients' lives.

Keywords: Dialysis water; Bacterial endotoxin; Physical/chemical water treatment; Treatment systems; Water disinfectants; Water quality

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