Contrôles d'un réseau d'eau en milieu hospitalier
Aptitude de quelques matériaux à former des biofilms

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Abstract

Since 2000, the Central Sterilization departments have been depended on the Pharmacy departement in hospitals; this is an optionnal activity which depends on the prefect authorities. The Central Sterilization department of the Robert Ballanger Hospital (RBH) in Aulnay-sous-bois set up actions following a significant bacteriological contamination of the water supplying the steam generators of autoclaves. This situation has put light on a lack of lawful recommendations on the sterilization environmental control program, on the risk management related to water and on a defect of knowledge of the activities of the various water actors. Consequently, an assessment was carried out in the sterilization department in public and private hospital structures in the region of Paris. The results show a great heterogeneity of the nature of physicochemical and microbiological controls carried out and of their frequency. Our survey underlines an important variation betwin pharmacist acknowledgment on water network in their establishment. It seems to depend on plumbing works realisation, bacteriological contamination experience and so on.
The importance of a centralization of the water risk management is highlight. All the hospital partners had a role to play, from the surgeon to the direction of the health institution. The engineering departments and the external subcontracting companies of maintenance are concerned too. Thus, a group related to water was instituted in RBH in order to update the plans of the water network, to follow the maintenance actions, to establish quality indicators, to make known and to apply the legislation. It seems to be better to each hospital to establish internal references allowed to the competent authorities recommendations because of the plurality of equipments, structures and age depend on the establishment.

Key words : Water, Quality Control, Sterilization, Risk Management, Health Institutions

An european draft test method for determining the microbial growth promoting properties of materials in contact with water intended for human consumption has been developped. This method or BPP test is based on a combination of two principles : determination of the active biomass concentration with ATP analysis and semi-dynamic test conditions with replacement of the test water once a week.

The ability of 6 materials to enhance the production of biomass was studied. These materials (copper, C-PVC, stainless steels, polybutene and polypropylene) were investigated at two temperatures, 30°C and 50°C. Representative samples of the materials were incubated in tap water over a period of 16 weeks. The test water was initially inoculated with a mixture of naturally occuring micro-organisms derived from river Seine and was replaced once a week. ATP measurements were carried out on days 56, 84 and 112.

The net BPP values (corrected for the effect of the water) clearly show differences between materials. The biomasss production appears to be related to the nature of the materials and to its incubation temperature. Some of them (metallic and synthetic products) exhibit a very slow microbial growth support potential while others are able to produce a thin biofilm. Temperature has an impact on the growth potential withhigh BPP values at 50°C in the majority of cases. Increasing temperature may accelerate biodegradability, may enhance the release of biodegradable compounds from materials or may lead to alternative biofilm properties.
This study has been conducted on unused materials during a short contact time. Thus, the ageng of the material, the effect of corrosion or fouling and the impact of various disinfection treatments have not been taken into account. Further investigations should be conducted to confirm the microbial promoting properties of these materials in practical conditions.

Résumé

Des travaux scientifiques ont été réalisés à l'hôpital Robert Ballanger au niveau des canalisations d'eau du service de stérilisation centrale. Il est apparu un manque de recommandations réglementaires quant à la gestion du risque lié à l'eau en stérilisation et un défaut de connaissance des activités des intervenants hospitalierset extérieurs sur le réseau d'eau de l'établissement

Les contrôles physico-chimiques et microbiologiques font apparaître une hétérogénéité dans les résultats dus en partie à l'absence de contrôle de qualité, à la multiplicité des intervenants ou à la vétusté des réseaux.

Il semble indispensable de mettre en œuvre une centralisation des résultats, de suivre les opérations de maintenance, de créer des indicateurs qualité et d'établir des référentiels internes, afin de mieux maîtriser la qualité de l'eau notamment utlisée en stérilisation centreale qui fournit des dispositifs médicaux stériles.

Dans ce même cadre une étude réalisée au Crecep sur les matériaux, a permis de quantifier l'aptitude de six matériaux, utilisés dans des installations de distribution d'eau à promouvoir la croissance microbienne.
Cette méthode est basée sur la détermination en biomasse active dans la phase eau et sur le matériau par dosage de l'ATP microbien. Deux températures ont été utilisées : 30°C et 50°C ainsi qu'une durée totale d'expérience de 16 semaines, pour des dosages intermédiaires à 8 et 12 semaines. Les matériaux utilisés sont : le cuivre, l'acier inoxydable (2 types), le C-PVC, le polybuthène et le polypropylène.