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The effects of chemical and mechanical stresses on the removal of biofilms formed by drinking water-isolated bacteria

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The presence of biofilms in drinking water distribution systems (DWDS) is a global concern. Those are responsible for aesthetic problems in drinking water (DW) such as taste, odor and color, and can also be responsible for public health problems when pathogens are biofilm colonizers. Therefore, it is of utmost importance to use effective control strategies. The aim of this work was to understand the effects of the combination of chemical (sodium hypochlorite – NaOCl) and mechanical (pipe flushing) treatments on the removal of single and dual species biofilms of two bacteria isolated from drinking water, *Acinectobacter calcoaceticus* and *Stenotrophomonas maltophilia*. Those are common strategies used in DWDS. A rotating cylinder reactor was used for the first time as DWDS model for biofilm formation and control. The combination of chemical and mechanical treatments was not able to completely remove biofilms from polyvinyl chloride (PVC) surface. Chemical treatment did not improve the flushing efficiency of *A. calcoaceticus* biofilms and increased the recalcitrance of *S. maltophilia* biofilms to mechanical treatment, even when high shear stress was applied. Nevertheless, NaOCl improved the mechanical removal of dual species biofilm. The dual species biofilm remaining after treatment with NaOCl at 0.5 $mg.l^{-1}$ was 78%, while after being treated with the NaOCl at the minimum inhibitory concentration 12% of biofilm remained on PVC surface. The overall results demonstrate that chemical and mechanical treatments commonly used in DWDS are not effective in biofilm control. The colonizer strain strongly influences the biofilm phenotype and its susceptibility to control strategies.