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Abstract (publication only)

Exploitation of a link between antibacterial agent-resistance and biofilm-formation by classical and emergent pathogens

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Objectives: In recent years nosocomial infections have gained growing importance. Among their etiological agents are “classical” pathogens such as *S.aureus* and also emergent pathogens, previously neglected, such as nontuberculous mycobacteria (NTM). The ability to resist to antibacterial agents, such as antibiotics and disinfectants, is shared by all of them. Here we aim to establish a link between bacterial virulence, antibacterial agents’ resistance and biofilm formation. **Methods:** Bacterial reference strains and clinical isolates were grown in adequate medium. Among the “classical” pathogens used are *E.coli*, *K. pneumoniae*, *S. aureus* and *P. aeruginosa*. The group of emergent pathogens includes *M.fortuitum*, *M.abcessus*, *M.chelonae*, *M.avium* etc. NTM susceptibility test to antibiotics was evaluated by broth based microdilution method and interpreted according to NCCLS guidelines. The disinfectant (oxygen peroxide, ammonium quaternary salts [AQS] and glutaraldehyde [GA] efficacy was performed according to the approved guidelines. The susceptibility was performed by two different methods: broth microdilution and diffusion in solid medium. In order to evaluate the effect of these agents in bacteria a scanning electron microscopy (SEM) study was performed. Biofilm forming ability was evaluated by the microtiter-plate test. The assay was performed at 25°C and 37°C in optimal growth media, phosphate saline buffer pH 7.4 and water during for different periods of time. Fast growing bacteria were assayed for 3 days while slow growers were assayed for 15 days. **Results:** The results of the antibiotic susceptibility test showed, with no surprise, that the resistant strains are the most prevalent. The resistance spectrum ranged from 1 to 5 antibiotics currently used in therapeutic schemes. Oxygen peroxide was the most effective disinfectant followed by QAS and GA. Nevertheless, among NTM we identified one isolate resistant to all disinfectants tested. The SEM analysis showed that different disinfectants caused different effects on bacteria suggesting different action mechanisms. The ability to form biofilms was time, medium and temperature dependent. **Conclusion:** Bacteria resistance to antibiotics and disinfectants vary in the same manner. The mechanisms involved in the resistance are not fully elucidated and more studies are needed to provide effective conclusions. Biofilm formation can be part of the mechanism involved both in resistance development and propagation of infections by these agents.