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RESEARCH ARTICLE

# Reducing healthcare-associated infections incidence by a probiotic-based sanitation system: A multicentre, prospective, intervention study

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## Abstract

Healthcare Associated Infections (HAI) are a global concern, further threatened by the increasing drug resistance of HAI-associated pathogens. On the other hand, persistent contamination of hospital surfaces contributes to HAI transmission, and it is not efficiently controlled by conventional cleaning, which does not prevent recontamination, has a high environmental impact and can favour selection of drug-resistant microbial strains. In the search for effective approaches, an eco-sustainable probiotic-based cleaning system (Probiotic Cleaning Hygiene System, PCHS) was recently shown to stably abate surface pathogens, without selecting antibiotic-resistant species. The aim of this study was to determine whether PCHS application could impact on HAI incidence. A multicentre, pre-post interventional study was performed for 18 months in the Internal Medicine wards of six Italian public hospitals (January 1<sup>st</sup> 2016—June 30<sup>th</sup> 2017). The intervention consisted of the substitution of conventional sanitation with PCHS, maintaining unaltered any other procedure influencing HAI control. HAI incidence in the pre and post-intervention period was the main outcome measure. Surface bioburden was also analyzed in parallel. Globally, 11,842 patients and 24,875 environmental samples were surveyed. PCHS was associated with a significant decrease of HAI cumulative incidence from a global 4.8% (284 patients with HAI over 5,930 total patients) to 2.3% (128 patients with HAI over 5,531 total patients) (OR = 0.44, CI 95% 0.35–0.54) (P < 0.0001). Concurrently, PCHS was associated with a stable decrease of