

## POINT-OF-USE WATER FILTRATION

### **Preventive efficacy and cost-effectiveness of point-of-use filtration in a subacute care unit.**

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Infections with *Pseudomonas aeruginosa* and other waterborne pathogens (WBPs) are major contributors to serious morbidity and mortality in hospitals. We sought to determine whether point-of-use (POU) water filtration might result in decreased risk of infection in the subacute care unit (SACU) of a 208-bed medical center. Our findings indicate that POU water filtration can significantly and cost-effectively reduce colonization of and infection with WBPs, including ventilator-associated pneumonia, in an SACU.

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### **Point-of-use water filtration reduces endemic *Pseudomonas aeruginosa* infections on a surgical intensive care unit.**

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**BACKGROUND:** Endemic infections because of *Pseudomonas aeruginosa* were observed on a surgical intensive care unit (ICU) for a period of >24 months. Tap water probing revealed persistent colonization of all ICU water taps with a single *P. aeruginosa* clonotype.

**METHODS:** Water outlets of the ICU were equipped with disposable point-of-use water filters, changed in weekly and, later, 2-week intervals. To delineate the effect of the filters, 4 study approaches were followed: (1) a descriptive analysis of the incidence of *P. aeruginosa* colonizations and infections, (2) microbiologic examinations of tap water before and after installation of the filters, (3) a comparative cohort analysis of representative patient samples from the prefilter and postfilter time periods, and (4) an analysis of general ward variables for the 2 periods. **RESULTS:** (1) The mean monthly rate (+/-SD) of *P. aeruginosa* infection/colonization episodes was 3.9 +/- 2.4 in the prefilter and 0.8 +/- 0.8 in the postfilter period. *P. aeruginosa* colonizations were reduced by 85% ( $P < .0001$ ) and invasive infections by 56% ( $P < .0003$ ) in the postfilter period. (2) Microbiologic examinations of tap water revealed growth of *P. aeruginosa* in 113 of 117 (97%) samples collected during the prefilter period, compared with 0 of 52 samples taken from filter-equipped taps. (3) In the comparative cohort analysis, a number of patient-related variables were significantly associated with *P. aeruginosa* colonization/infection. Considering these variables in a multivariate analysis, belonging to the postfilter cohort was the factor most strongly associated with a reduced risk of *P. aeruginosa* positivity (relative risk, 0.04;  $P = .0002$ ). (4) General ward variables such as bed occupancy, personnel-to-patient ratio, or microbiologic culturing density did not differ significantly between the 2 periods.

**CONCLUSION:** Taking into account various patient-related and general ward variables, point-of-use water filtration was associated with a significant reduction of chronically endemic *P. aeruginosa* colonizations/infections on a surgical ICU.

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### **Related articles**

- Ecology of Pseudomonas aeruginosa in the intensive care unit and the evolving role of water outlets as a reservoir of the organism.  
*Am J Infect Control. 2005 Jun; 33(5 Suppl 1):S41-9.*  
[Am J Infect Control. 2005]
- Common RAPD pattern of Pseudomonas aeruginosa from patients and tap water in a medical intensive care unit.  
*Int J Hyg Environ Health. 2006 Jul; 209(4):325-31. Epub 2006 Jun 5.*  
[Int J Hyg Environ Health. 2006]
- Tap water colonization with Pseudomonas aeruginosa in a surgical intensive care unit (ICU) and relation to Pseudomonas infections of ICU patients.  
*Infect Control Hosp Epidemiol. 2001 Jan; 22(1):49-52.*  
[Infect Control Hosp Epidemiol. 2001]
- Epidemiology of Pseudomonas aeruginosa and risk factors for carriage acquisition in an intensive care unit.  
*J Hosp Infect. 2003 Apr; 53(4):274-82.*  
[J Hosp Infect. 2003]

### **Cross-colonisation with Pseudomonas aeruginosa of patients in an intensive care unit**

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BACKGROUND: Ventilator-associated pneumonia (VAP) caused by Pseudomonas aeruginosa is usually preceded by colonisation of the respiratory tract. During outbreaks, colonisation with P aeruginosa is mainly derived from exogenous sources. The relative importance of different pathways of colonisation of P aeruginosa has rarely been determined in non-epidemic settings.

METHODS: In order to determine the importance of exogenous colonisation, all isolates of P aeruginosa obtained by surveillance and clinical cultures from two identical intensive care units (ICUs) were genotyped with pulsed field gel electrophoresis. RESULTS: A total of 100 patients were studied, 44 in ICU 1 and 56 in ICU 2. Twenty three patients were colonised with P aeruginosa, seven at the start of the study or on admission and 16 of the remaining 93 patients became colonised during the study. Eight patients developed VAP due to P aeruginosa. The incidence of respiratory tract colonisation and VAP with P aeruginosa in our ICU was similar to that before and after the study period, and therefore represents an endemic situation. Genotyping of 118 isolates yielded 11 strain types: eight in one patient each, two in three patients each, and one type in eight patients. Based on chronological evaluation and genotypical identity of isolates, eight cases of cross-colonisation were identified. Eight (50%) of 16 episodes of acquired colonisation and two (25%) of eight cases of VAP due to P aeruginosa seemed to be the result of cross-colonisation.

CONCLUSIONS: Even in non-epidemic settings cross-colonisation seems to play an important part in the epidemiology of colonisation and infection with P aeruginosa.

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- Rev Environ Contam Toxicol. 2009;201:71-115.