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Letter to the Editor

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A Commentary on "Outbreak of Cystoscopy-Related Urinary Tract Infections With *Pseudomonas aeruginosa* in South Korea, 2022: A Case Series"

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To the editor,

Pseudomonas aeruginosa, a Gram-negative bacterium commonly found in healthcare environments, is a major pathogen responsible for healthcare-associated infections (HAIs) and is recognized as a significant global public health concern. *P. aeruginosa* accounts for approximately 7%–10% of HAIs, causing a variety of infections, particularly ventilator-associated pneumonia, urinary tract infections (UTIs), and bloodstream infections [1-3].

Infections caused by *P. aeruginosa* lengthen hospitalization, increase medical costs, and, in some cases, are associated with high mortality rates [4]. A major concern is the bacterium's strong association with antibiotic resistance. Recent studies have reported multidrug resistance rates of up to 80.5% in clinical isolates, complicating treatment and posing significant challenges to infection control [5].

Hospital environments, especially moist areas such as sinks and faucets, serve as key reservoirs for *P. aeruginosa* [6]. However, recent studies suggest that direct transmission from these environments may be lower than previously assumed, with some findings indicating that only 15% of bloodstream infections caused by *P. aeruginosa* are directly linked to environmental sources [4]. Therefore, a multifaceted approach—including rigorous environmental management, proper hand hygiene, antimicrobial stewardship, and continuous surveillance systems—is essential for the effective prevention and management of HAIs caused by this pathogen.

This study investigating *P. aeruginosa* infections following cystoscopy makes an important contribution to the field. The investigation involved 353 patients who underwent cystoscopy, of whom 6 developed febrile UTIs requiring hospitalization. *P. aeruginosa* was detected in 4 of these 6 patients, and environmental surveillance cultures identified the bacterium in a diluted solution sample of a dual-enzymatic detergent (EmPower, Metrex Research Corp., Orange, CA, USA). The authors reported that after changing the disinfectant and en-

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hancing the cleaning protocol, no further bacterial growth was observed, suggesting that the contaminated detergent was the likely source of the cystoscopy room associated infections [7].

Infection control in cystoscopy suites is critically important, particularly given the growing number of cystoscopic procedures. Beyond the limitations acknowledged by the authors, several key aspects require further discussion. Although *P. aeruginosa* was identified in the detergent, the precise route of contamination remains unclear. As this bacterium is a common opportunistic pathogen in healthcare settings, cross-transmission via healthcare workers' hands cannot be ruled out. Transmission of *P. aeruginosa* is known to occur more frequently in intensive care units (ICUs), and multiple outbreaks in neonatal ICUs have been reported. One study found that exposure to specific healthcare personnel was a significant risk factor for *P. aeruginosa* infection [8,9].

P. aeruginosa is a major cause of HAIs, particularly in moist environments where it forms biofilms that enable prolonged survival [10]. Preventing biofilm formation is crucial because biofilm-associated *P. aeruginosa* can persist under low-oxygen conditions and in extreme environments, making eradication difficult [11]. In healthcare settings, this bacterium is predominantly found on moist surfaces—including sinks, showerheads, and faucets—which serve as critical sources of HAIs [12].

Thus, stringent environmental management is essential for preventing *P. aeruginosa*-related HAIs. Key measures include:

(1) Hand hygiene and personal protective equipment (PPE) compliance – strengthen adherence to alcohol-based hand sanitizers, ensure the availability of proper handwashing facilities, and enforce mandatory PPE use in high-risk areas.

(2) Healthcare worker education – provide continuous training on disinfectant use, proper sterilization protocols, and infection control measures to prevent cross-contamination.

(3) Environmental cleaning and disinfection – implement routine cleaning and disinfection protocols, with particular attention to moist environments such as sinks, faucets, and showers, which serve as reservoirs for *P. aeruginosa*.

(4) Medical device reprocessing and sterilization – ensure strict adherence to proper cleaning, drying, and sterilization protocols for reusable medical devices, including cystoscopes, to prevent biofilm formation and bacterial persistence; rapid drying after cleaning is particularly important.

(5) Surveillance and monitoring systems – establish continuous environmental surveillance cultures and infection monitoring for early detection and intervention, particularly in high-risk areas such as hospital sinks, drains, and medical equipment storage units [10-13].

P. aeruginosa is generally susceptible to alcohol-based disinfectants, making alcohol-based hand sanitizers a crucial component of infection prevention. Notably, increased use of these sanitizers has been significantly correlated with a reduction in carbapenem-resistant *P. aeruginosa* infections [14]. However, some limitations exist; for instance, certain commercial alcohol wipes do not demonstrate sufficient bactericidal activity within 1–15 minutes of contact [15].

A critical survival mechanism of *P. aeruginosa* in hostile environments, including those with antibiotic exposure, is biofilm formation [10]. Therefore, preventing HAIs caused by this pathogen requires a dual approach—strict environmental management coupled with proper disinfection. Through these strategies, healthcare institutions can effectively inhibit biofilm formation and limit bacterial persistence and transmission. I would like to express our gratitude to the authors for conducting this pioneering study on cystoscopy-related *P. aeruginosa* infections in Korea. This research underscores the importance of infection control in endoscopic procedures and provides valuable insights for preventing similar outbreaks in the future.

• **Conflict of Interest:** The author has nothing to disclose.

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