

Need for more environmental control of *Klebsiella* and other gram negative infections

To the editor

I read with interest the excellent report by Nakipoglu et al, on the contamination of *Klebsiella* and other gram negative bacteria on the health care provider hands and many types of medical equipment in a neonatal unit.¹ In recent years, there has been a large increase in the number of antibiotic resistant *Klebsiella*, *Acinetobacter*, *Pseudomonas*, and other gram negative bacteria in both the developing and developed worlds.² Environmental control is an often overlooked factor in controlling infections by *Klebsiella* and other gram negative bacteria.

Viable *Klebsiella* can be found in many hospital locations including hands, medical equipment, inanimate surfaces, air and water. One study reported that *Klebsiella* was found on the hands of 17% health care providers and could remain viable for at least 2.5 hours on hands.³ *Klebsiella* can remain viable for at least 30 months on dry inanimate surfaces.⁴ *Klebsiella* can remain viable in dry air for at least 4 hours and airborne *Klebsiella pneumoniae* has been shown to cause lung infections in mice.^{5,6} Comprehensive and stringent environmental controls can greatly reduce infection rates of *Klebsiella* and other gram negative bacteria. A Belgian study reported that a severe hospital outbreak of multi-antibiotic resistant *Klebsiella pneumoniae* was stopped by a comprehensive program of isolating and cohorting patients, microbial surveillance of patients and environmental surfaces, increased hand washing with alcohol based rubs, and improved room and medical instrument cleaning.⁷ Several studies have reported that intense handwashing campaigns can significantly reduce *Klebsiella* infections rates.^{8,9} The use of High Efficacy Particulate Filters (HEPA) have been shown to significantly reduce levels of viable *Pseudomonas* and other bacteria in hospital air.¹⁰

Again, I thank Nakipoglu et al¹ for their interesting article. Far more emphasis on environmental controls are needed to control hospital outbreaks of *Klebsiella* and other gram negative bacteria.

Luke Curtis
Norwegian American Hospital
Chicago, Illinois
1328 Greenwood
Wilmette, IL 60091 USA

Reply from the Author

In a letter to the Editor regarding our article published very recently,¹ Dr. Curtis has mentioned valuable information on the survival of *Klebsiella pneumoniae* on the hands of the health care workers (HCWs) and inanimate surfaces. He also focused on different ways to control the exogenous *Klebsiella pneumoniae* and other Gram negative bacilli in Neonatal Intensive Care Unit (NICU) depending on the results of many studies. Indeed, *Klebsiella pneumoniae* was the major pathogen responsible for many outbreaks occurred in our NICU in the years precedes this study. As we expected *Klebsiella pneumoniae* was most dominant contaminants (25.8%) which obviously point to the reservoirs of *Klebsiella pneumoniae* in NICU. The question that should answer in this subject is why *Klebsiella pneumoniae* is a dominant contaminant in the NICU environment and not other contaminants. Depending on the results of the studies and on our experiences, the ability of *Klebsiella pneumoniae* to survive on inanimate surfaces for a long period,^{4,5} harbouring of virulence factors (capsule, siderophore), resistance genes on plasmids (especially ESBL on large size), presence of substances enriched with proteins and carbohydrate on different surfaces or in containers (breast milk collecting containers), low weight neonates with immunological defects, and random use of broad spectrum antibiotics are some of the main factors that might selected this bacteria among other contaminants.

Finally unhygienic hands of HCWs playing an important role in transporting the selected bacteria to neonates especially if the first defence line (skin) of the neonates was damaged or any invasive procedure was applied by these HCWs. From our observation, behavior is also very important, for example HCWs who did not obey hygienic hand washing recommendations also not changing his/her gloves when contaminated. As noted briefly, the hygienic hand washing with alcohol based antiseptics and reduction of exogenous contaminants to the safety level are critical tools in prevention of neonatal infections with *Klebsiella pneumoniae*. We thank Dr. Curtis for his contribution with valuable observations on our study.

Yasar Nakipoglu
Mine A. Kucuker
Handan Katranci
Sengul Derbentli
Department of Microbiology and Clinical Microbiology
Istanbul Faculty of Medicine
University of Istanbul
Istanbul, Turkey

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