Cold spots contaminated in high humidity incubators

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Microbes in human incubators, like those found in neonatal intensive care units, grow most robustly on cold spots when the relative humidity is at least 60 percent, according to a paper in the December 2011 issue of the journal Applied and Environmental Microbiology.

Two of the high humidity incubators tested in this study sustained contamination by Staphylococcus, "a reason for concern, since the vast majority of infections in preterm neonates are caused by… [staphylococci]," according to the report. Additionally, the researchers observed "slightly increased numbers of Gram-negative bacteria at the cold sites of neonatal incubators with high humidity levels," noting that infections with such "are known to have the highest neonatal death rates."

In this study, Hermie J.M. Harmsen and colleagues of the University of Groningen, The Netherlands, sampled cold and warm spots from 12 incubators with a relative humidity of at least 60 percent, and a temperature of at least 34 degrees C., and 11 incubators with a relative humidity of less than 60%, and a temperature of less than 34 degrees C. Most of the cold and warm spots from the latter incubators, as well as the warm spots from the former turned up negative for microbial contamination, but cold spots from the incubators with high relative humidity "had much higher colony forming unit counts on average than the other three groups," says Harmsen.

The research is important, says Harmsen, in order to reduce the

incidence of microbial infection in neonates. “A direct relation between microbial growth in an incubator and infection has yet to be shown but common sense dictates it would be better if the temperature distribution within an incubator were as homogeneous as possible,” he says.

Cold spots in warm, humid incubators and other closed environments are particularly vulnerable to contamination because the most important limiting factor for microbes in such environments is lack of moisture, and in such environments, the relative humidity is higher around cold spots, says Harmsen.

Interestingly, the research grew out of a project to create a risk assessment model for microbial growth on board the International Space Station, says Harmsen. “A neonatal incubator is not only a perfect model system for the International Space Station, as its average temperature and relative humidity are controlled and its inhabitants are both somewhat immune-compromised; this clinical setting is also very relevant itself as microbial infection and subsequent mortality in neonates are matters of great importance,” says Harmsen. “Being able to predict which areas of an incubator might be more highly contaminated, based solely on the local temperature distribution, would facilitate improvement of hygiene in the incubator.”

More information: M.C. de Goffau, et al., 2011. Cold spots in neonatal incubators are hot spots for microbial contamination. *Appl. Environ. Microbiol.* 77:8568-8572

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