Drug-resistant staph bacteria prevalence higher in young children living with hog workers

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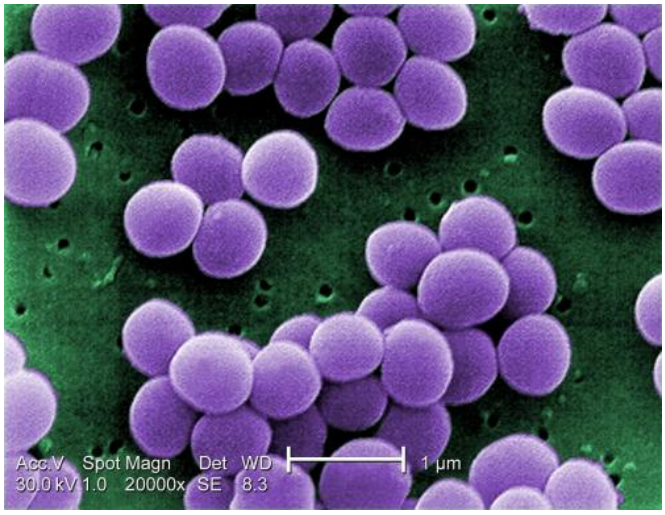

Scanning electron micrograph of S. aureus; false color added. Credit: CDC

Young children who reside with adults who work on large industrial hog operations in rural North Carolina had a higher prevalence of antibiotic-resistant in their nasal passages than children who live with adults who live in the same community but do not work on such operations, a new study suggests.

While no children or adults participating in the study became sick, the researchers say the findings raise concerns because of how many children living with hog workers carried potentially harmful antibiotic-resistant *S. aureus*—methicillin-resistant *S. aureus* (MRSA) and multidrug-resistant *S. aureus* (MDRSA) —in their noses. The study, which will be published online Oct. 18 in the journal *Environmental Health Perspectives*, also raises the question of whether the bacteria might be able to travel home on the protective clothing and equipment worn by the workers.

In Europe, studies have shown that children living with industrial hog operation workers are at risk of acquiring drug-resistant staph from their parents, carrying these strains in their noses and also developing staph infections. This has led the European Union to restrict the non-therapeutic use of antibiotics that promote pig growth to ready them for market sooner.

"Before this study, we didn't know how common it was for children living with industrial hog operation workers in North Carolina to carry antibiotic-resistant *S. aureus* in their noses. Now that we know how prevalent MRSA and MDRSA are, important next steps are to learn how children are becoming exposed and whether there are implications for their health," says study leader Christopher D. Heaney, PhD, MS, an assistant professor in the Bloomberg School's departments of Environmental Health and Engineering and Epidemiology.

Although children tend to be susceptible to developing staph infections, the researchers caution that none of the children or adults participating in the study reported becoming sick during the course of the study. They say it is too early to draw any conclusions about possible infection and transmission, but note the high prevalence in children's nasal passages warrants further studies of possible connections between nasal carriage and infection.

Antibiotic-resistant *S. aureus* carriage is a concern in health care settings, including hospitals, because it can increase chances of infection and transmission to other patients. Patients are often tested for MRSA carriage so precautions can be taken.

The study, a collaboration among researchers at the Johns Hopkins Bloomberg School of Public Health, the University of North Carolina Gillings School of Global Public Health and community organizers at the Rural Empowerment Association for Community Help in Duplin County, NC, enrolled 400 adult-child pairs in the top 10 hog-producing counties in North Carolina, the second largest hog-producing state in the United States. One set of 198 pairs included an adult who worked at an industrial hog operation and a child under age seven living in the same household. The other 202 pairs consisted of an adult community resident who did not work on any type of livestock operation and a child under age seven living in the same household. The research team collected nasal swabs from all participants during home visits between March and October 2014. Adults in both groups also completed a questionnaire about themselves and the child participating in the study.

The researchers found that 23 percent of children living with industrial hog operation workers were carrying MDRSA, meaning the *S. aureus* was resistant to three or more antibiotic drug classes, as compared to eight percent of children who lived with adults who weren't livestock workers.

Meanwhile, 14 percent of children who lived with an industrial hog operation worker were carrying MRSA compared to six percent of children who lived with adults who weren't livestock workers.

The researchers also found that children who lived with an industrial hog operation worker who reported bringing home personal protective equipment such as masks, coveralls, boots and/or hats from the hog operation had a higher prevalence of carrying MRSA and MDRSA in their noses than children who lived with a hog operation worker who did not bring this equipment home. The researchers couldn't confirm whether the children were carrying antibiotic resistant *S. aureus* from pigs because they didn't have access to sample pigs at industrial hog operations.

Antibiotic resistance is a growing public health crisis, with an estimated two million people in the United States getting sick and thousands dying, according the Centers for Disease Control and Prevention. The use of antibiotics in livestock - as much as 80 percent of antibiotics sold in the United States are used in livestock production - is thought to be a contributing factor for increased antibiotic resistance. Last month, all 193 United Nations states pledged to combat the spread of antibiotic-resistance and related infections.

"Our hope is that this study raises awareness about antibiotic resistant *S. aureus* exposures among children living with industrial hog operation workers and initiates more discussions about antibiotic use and resistance in communities with a high density of hog production," says study author Devon Hall, executive director of the Rural Empowerment Association for Community Help, located in Duplin County, North Carolina.

More information: "The Prevalence of Antibiotic-resistant Staphylococcus aureus Nasal Carriage among Industrial Hog Operation Workers, Community Residents, and Children Living in their Households: North Carolina, USA" *Environmental Health Perspectives*, 2016.

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