

2013-07-23-052 Staph. aureus (MRSA) - USA: (NC) livestock-associated, farm workers
To: (05) Bacteriology, general; (07) Zoonoses, general; (09) Resistance of microorganisms;

STAPHYLOCOCCUS AUREUS (METHICILLIN-RESISTANT) - USA: (NORTH CAROLINA),
LIVESTOCK-ASSOCIATED, FARM WORKERS

A ProMED-mail post

Date: Wed 3 Jul 2013

Source: MedlinePlus [edited] <http://www.nlm.nih.gov/medlineplus/news/fullstory_138399.html>

A new study has raised more concerns about the widespread use of antibiotics in U.S. livestock [Rinsky JL, Nadimpalli M, Wing S, et al. Livestock-Associated Methicillin and Multidrug Resistant *Staphylococcus aureus* Is Present among Industrial, Not Antibiotic-Free Livestock Operation Workers in North Carolina.

Available at:

<<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0067641>>].

Researchers swabbed the noses of workers at 2 types of livestock farms in North Carolina. The research team was looking for antibiotic-resistant *Staphylococcus aureus* bacteria, including the tough-to-treat methicillin-resistant *S. aureus*, known as MRSA. The workers weren't showing signs of infection at the time of the study.

They found antibiotic-resistant bacteria associated with livestock in workers at industrial farms where animals are kept in confinement and given antibiotics to promote their growth. The noses of workers who handle antibiotic-free livestock set out in pastures did not contain antibiotic-resistant bacteria, according to the study, which was published on 2 Jul 2013 in the journal PLoS One.

"This study shows that these livestock-associated strains are present among workers at industrial livestock operations, and that these strains are resistant not just to methicillin, but to multiple antibiotics, including antibiotics that are used to treat human infections," study corresponding author Christopher Heaney, an assistant professor of environmental health sciences and epidemiology at the Johns Hopkins Bloomberg School of Public Health in Baltimore, said in a school news release.

Multidrug-resistant strains of *S. aureus* bacteria were about twice as common among industrial livestock operation workers as among antibiotic-free livestock farm workers. And *S. aureus* strains that were resistant to tetracycline -- an antibiotic used in industrial livestock production since the 1950s -- were 19 times more common among industrial livestock operation workers than among those at antibiotic-free livestock farms.

Although the study showed an association between exposure to animals given antibiotics and development of drug-resistant bacteria, it did not prove a cause-and-effect relationship.

S. aureus can cause a range of illnesses in people, from minor to life-threatening skin, bloodstream, respiratory, urinary and surgical-site infections. Like most illnesses caused by bacteria, *S. aureus* infections are treated with antibiotics, but drug-resistant strains can be especially difficult to treat.

[Byline: Robert Preidt]

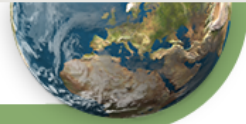
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[The news report above refers to a recently published study, the abstract of which is reproduced below (Rinsky JL, Nadimpalli M, Wing S, Hall D, Baron D, et al. (2013) Livestock-Associated Methicillin and Multidrug Resistant *Staphylococcus aureus* Is Present among Industrial, Not Antibiotic-Free



Livestock Operation Workers in North Carolina. PLoS ONE 8(7): e67641.

doi:10.1371/journal.pone.0067641.

Available at:

<<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0067641>>:

Abstract

"Objectives. Administration of antibiotics to food animals may select for drug-resistant pathogens of clinical significance, such as methicillin-resistant *Staphylococcus aureus* (MRSA). In the United States, studies have examined prevalence of MRSA carriage among individuals exposed to livestock, but prevalence of multidrug-resistant *S. aureus* (MDRSA) carriage and the association with livestock raised with versus without antibiotic selective pressure remains unclear. We aimed to examine prevalence, antibiotic susceptibility, and molecular characteristics of *S. aureus* among industrial livestock operation (ILO) and antibiotic-free livestock operation (AFLO) workers and household members in North Carolina.

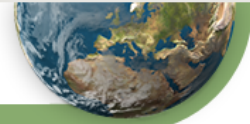
"Methods. Participants in this cross-sectional study were interviewed and provided a nasal swab for *S. aureus* analysis. Resulting *S. aureus* isolates were assessed for antibiotic susceptibility, multi-locus sequence type, and absence of the *scn* gene (a marker of livestock association).

"Results. Among 99 ILO and 105 AFLO participants, *S. aureus* nasal carriage prevalence was 41 percent and 40 percent, respectively. Among ILO and AFLO *S. aureus* carriers, MRSA was detected in 7 percent (3/41) and 7 percent (3/42), respectively. 37 percent of 41 ILO versus 19 percent of 42 AFLO *S. aureus*-positive participants carried MDRSA. *S. aureus* clonal complex (CC) 398 was observed only among workers and predominated among ILO (13/34) compared with AFLO (1/35) *S. aureus*-positive workers. Only ILO workers carried *scn*-negative MRSA CC398 (2/34) and *scn*-negative MDRSA CC398 (6/34), and all of these isolates were tetracycline resistant.

"Conclusions. Despite similar *S. aureus* and MRSA prevalence among ILO and AFLO-exposed individuals, livestock-associated MRSA and MDRSA (tetracycline-resistant, CC398, *scn*-negative) were only present among ILO-exposed individuals. These findings support growing concern about antibiotics use and confinement in livestock production, raising questions about the potential for occupational exposure to an opportunistic and drug-resistant pathogen, which in other settings, including hospitals and the community, is of broad public health importance."

Livestock-associated (LA)-MRSA is largely a single clonal complex on the basis of multilocus sequence typing (ST398) and non-typeable (NT) because of the inability to type it by pulsed-field gel electrophoresis (PFGE) using *Sma*-1. LA-MRSA initially was detected in the Netherlands in pigs and pig farmers in 2003. This strain of presumably animal origin (nearly 40 percent of pigs in the Netherlands have been found to be colonized by this strain) has been reported to be responsible for more than 20 percent of all MRSA infections in the Netherlands (<<http://www.medscape.com/viewarticle/568512>>) and has been found in community-associated human infections in several European countries, North America, and Asia. Nosocomial transmission of this strain has also been reported recently among patients and health care workers in the Netherlands (<<http://www.blackwellpublishing.com/eccmid18/abstract.asp?id=69352>>).

According to an investigative story in the Washington Post, of the 35 million pounds of antibiotic used in the US in 2008, 70 percent went to pigs, chickens, and cows to help prevent disease and make them grow large quickly. Confinement of these farm animals at high stocking density requires use of antibiotics to mitigate the spread of disease exacerbated by these crowded living conditions. Similarly, intensive fish farming provides conditions that require large quantities of antibiotics to be added to feed (<<http://www.bellona.org/aquaculture/artikler/Antibiotics>>). Exposure to antibiotics allows survival of antibiotic resistant mutants and organisms that have acquired from other bacteria genes that encode antibiotic resistance.



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Antibiotics, as well as bacteria that carry antibiotic resistance genes, from agricultural sources can enter the environment via wastewater treatment plant effluents, processing plant effluents, application of agricultural waste and biosolids to fields, and leakage from waste-storage containers and landfills and can facilitate the development and spread of antibiotic resistance (Tello A, Austin B, Telfer TC: Pressure of Antibiotic Pollution on Bacteria of Importance to Public Health. Environ Health Perspect. 2012 August; 120(8):

1100-6. Published online 2012 Available at <<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3440082/>>). Consequently, antibiotic resistant pathogens have been found on non-farm workers and wildlife, as well as farm workers, in farm country (see ProMED-mail post Antibiotic resistance - USA: (IA) MRSA, wildlife 20121023.1360127). - Mod.ML]

[The study is slightly flawed. They are testing the noses of factory farm workers, and those on antibiotic free operations. Why did they not test some producer that is small, or middle of the road but still uses some antibiotics? Why not test a cow-calf producer? Furthermore the use of the term factory farm is not descriptive and the plan is to make the case that antibiotic resistance comes from animals. There seems to be no history of health conditions or legitimate drug usage by the people tested. Certainly no conclusion can be arrived at, other than it is a rush to publish and draw a conclusion. - Mod.TG

A HealthMap/ProMED-mail map can be accessed at: <<http://healthmap.org/r/2M9w>>.]

[see also:

2012

Staph. aureus (MRSA) - UK: dairy cattle, zoonotic implications
20121214.1451726

Antibiotic resistance - USA: (IA) MRSA, wildlife 20121023.1360127 2010

Antibiotic resistance & agricultural uses - USA (03) 20100223.0610 Antibiotic resistance & agricultural uses - USA (02): (Europe)

20100220.0585

Antibiotic resistance & agricultural uses - USA 20100216.0552

2009

Staph. aureus (MRSA), human, animals - Europe: evaluation

20090618.2255

2008

Staph. aureus (MRSA), human, livestock - UK: (Scotland) 20080605.1799

2007

Staph. aureus (MRSA), human, porcine - Canada, USA 20071109.3640 Staph. aureus (MRSA), comm. acq., human, equine - Canada 20070108.0076]
