Upper Midwest Agricultural Safety and Health Center

UMASH

RESEARCH BRIEF

Project Dates: 2011 - 2016

MRSA Colonization and Infection in Swine Veterinarians

PROJECT PERSONNEL

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SUMMARY OF FINDINGS:

1. The initial studies revealed that swine veterinarians in the USA have prevalences of *S. aureus* (63%) and MRSA (9%) that exceed estimates for the general population in the USA (28%, 1.5%). For the most recent completed study (June 2019), prevalence of *S. aureus* (72%) and MRSA (12%) in swine veterinarians were again much higher than in the companion animal veterinarians and the general US population (37% and 2% respectively).
2. Of all the isolates, about 80% of the swine vet isolates were variants commonly found in pigs.
3. Both transient contamination and long term colonization can occur in veterinarians.
4. Despite high exposure, events of clinical *S. aureus* infection were not common.
5. Injuries *(mainly needle stick)* and non- infectious health problems predominate in swine veterinarians.
6. On farms, some PPE were regularly used but hearing protection and respiratory protection were employed sporadically.
7. The project also produced a library of *S. aureus* isolates from swine veterinarians.

PROJECT BACKGROUND

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a critically important human pathogen that is an emerging concern in veterinary medicine and animal agriculture. It has become apparent that animals, particularly pigs, can constitute a separate MRSA reservoir and be a source of MRSA in humans. Some individuals who work closely with pigs, such as veterinarians, have high MRSA colonization rates. Considering this fact, intensive studies were carried out to provide new insight into the dynamics of interspecies transmission, and related health risks, of *Staphylococcus aureus* in the US swine industry.

The studies were designed to accomplish the following specific tasks:

1. Determine incidence and prevalence of nasal colonization of swine veterinarians with *S. aureus* (MRSA and MSSA) in the US.
2. Determine whether *S. aureus* strains shown to colonize pigs are causing clinical infections in swine veterinarians.
3. Describe use of personal protection practices of US swine veterinarians.
4. Quantify associations between risks of colonization/ infection of swine veterinarians with MRSA/MSSA and exposure to pigs and use of PPE.
5. Assess the trends in antibiotic resistance following regulatory changes in antibiotic use in the swine industry.

In the first phase of the study, 68 swine veterinarians across 15 states, predominantly in the major swine producing regions of the Midwest and Southeast, were recruited to participate in a longitudinal study. During the study period, the microbial genotypes detected in 38 veterinarians were compared with those found in pigs. Since 2016, sampling and survey data collection have been conducted from 117 participants. In the recent study, other zoonotic agents (influenza A virus and Hepatitis E virus) have also been included.

RESEARCH BRIEF:

Overview on MRSA Colonization and Infection in Swine Veterinarians

WHAT DOES IT MEAN FOR AGRICULTURAL HEALTH AND SAFETY?

In general, the studies evidently provided new perception into the dynamics of interspecies transmission, and related public health threats of Staphylococcus aureus in the US swine industry. The prevalence and isolates identified revealed in the study likely reflects the increased risk of exposure to S. aureus that occurs in pig farm environments and hence, veterinarians, farm owners, and farm workers can be permanently colonized by MRSA of swine origin and could eventually act as a means for the spread of superbugs to the general public.

IN CONCLUSION...

MRSA appears to be less common in US pig herds than anticipated and no serious infections have been seen in swine workers or veterinarians. The recent (2016-2019) report of the study team also showed that even though the prevalence is higher in swine veterinarians, there appears to be no indication of increasing MRSA prevalence. Nevertheless, as microorganisms are continuously changing, which is a natural phenomenon, similar studies or monitoring strategies are required to ensure the safety of veterinarians, farm owners, and farmworkers.

WHAT'S NEXT? WHAT ARE THE POSSIBLE SOLUTIONS OR RECOMMENDATIONS?

It is well recognized that people having regular animal contact are at the front line for exposure to known and emerging pathogens. **According to the findings, animal health workers, swine farm owners, farmworkers, visitors should ensure/aware of the following:**

- The period of follow up was limited and there were also areas of uncertainty regarding the duration of colonization of occupationally exposed people and its implications for disease risk of *S. aureus*. Therefore, more extensive observations (monitoring) of *S. aureus* infection risk in swine workers have paramount importance.
- Periodic educational programs are needed to promote better practices for veterinarians and other groups who are occupationally exposed to those animals.
- Ensuring good agricultural practice in the farms.
- Judicious use of antimicrobials should be practiced in farms to reduce the occurrence of drug resistance.
- Restricting visitors (avoid unnecessary visits) and direct contact with farm animals.
- Proper use respiratory protection, and other PPE usage need to be improved.
- Integrative work among pig farm owners, government, and concerned organizations is strongly recommended.

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