

What is *Staph aureus* & MRSA?

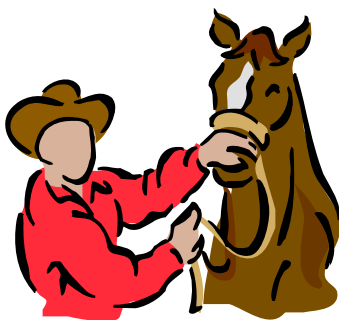
- *Staph aureus* (short for *Staphylococcus aureus*) is a bacterium that is normally carried in the nose of about 30% of the general human population, and in the nose of about 10% of normal horses. Typically it causes no problems at all, but it is an **opportunistic pathogen** – if a person or horse gets injured or sick for another reason, *S. aureus* can take advantage of the body's weakened defenses and cause infection in almost any tissue, but skin and soft tissue infections are most common.
- Strains of *S. aureus* can be either methicillin-resistant (**MRSA**) or methicillin-susceptible (MSSA). But MRSA strains are not just resistant to methicillin, they're **resistant to all the antibiotics in the same drug family as methicillin** (the beta lactams), including many common drugs such as penicillins and cephalosporins.
- Some strains of MRSA, particularly in human hospitals, are also resistant to other families of antibiotics, which can make infection extremely difficult to treat.
- People and animals can carry MRSA without any signs of infection at all. This is known as **colonization**, which may be short-term or long-term. Illness due to **infection** with MRSA can be very mild to very severe, even fatal.
- Horses tend to carry a different type of MRSA than those which are commonly carried by humans. However, MRSA from horses can still colonize or infect people, and MRSA from people can colonize or infect horses.



How Common is MRSA?

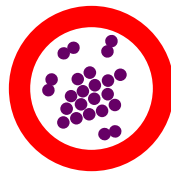
Humans

- ▶ MRSA may be carried in the nose by 0.2-3.5% of the general population, depending on geographical location.
- ▶ MRSA is an important **hospital-associated (HA)** pathogen, which causes infection in people with risk factors such as recent hospitalization, surgery, antibiotic use, chronic illness, and residence in long-term care facilities.
- ▶ Infection with MRSA has also become a **community-associated (CA)** disease, which can affect anyone in the general population, even without traditional HA risk factors.
- ▶ The prevalence of MRSA varies widely in different parts of the world. In some places in the USA, more than half of all *S. aureus* isolates are MRSA, whereas in some European countries less than 1% are MRSA.
- ▶ People who work with horses, cattle or pigs may be at increased risk of acquiring MRSA.
 - Studies have shown high rates of MRSA colonization (up to 15%) in horse owners and horse veterinarians. The types of MRSA found in these individuals suggest that many of them acquired the MRSA from horses.



Horses

- *Staphylococcus aureus* can also be found in the nose, intestinal tract or skin of a small percentage of normal, healthy horses, although the frequency with which it is found varies widely between studies.
- Studies in different areas of North America and Europe have identified MRSA in 0-10.9% of healthy horses, but on some farms over 50% of horses may carry MRSA.
- Most horses that are **colonized** with MRSA do not have an infection, and never develop an infection. However, they are at higher risk for developing an MRSA **infection** if they become sick, injured or stressed for another reason, such as when they are admitted to an equine hospital.
- **Risk factors** for MRSA colonization in horses in the general population have not been adequately studied. Horses that have been treated with antibiotics and that live on farms where MRSA is known to be present are more likely to be carrying MRSA when they are admitted to an equine hospital.
- As in human hospitals, MRSA can be spread between horses in equine hospitals. However, most MRSA infections in horses occur in animals that have never been in an equine hospital.
- The vast majority of MRSA infections in horses in North America have been caused by one specific strain, called Canadian epidemic MRSA-5 (**CMRSA-5**) or USA500. This is a human MRSA strain, but it is uncommon in most people. It is suspected that this strain originated in humans, but it became adapted to horses. This strain is most commonly found in people that work with horses, which strongly suggests that people and horses can transmit MRSA back and forth in both directions.



- There are also recent reports of another MRSA strain, called ST398, in horses in Canada and Europe. This strain is believed to have originated in pigs and cattle, but can also be spread between people and animals.

How Do People & Horses Get MRSA?

Transmission of MRSA to people or animals can lead to colonization alone, infection, or both.

- **In human hospitals**, MRSA is most often transmitted on the **hands of healthcare workers**. This is probably the same in veterinary hospitals.
- Transmission of MRSA **in the community** occurs through **direct contact** with high-risk, colonized or infected individuals. Outbreaks have occurred on sports teams, military bases and prisons where many people may have close contact with each other, hygiene may be less than ideal, and breaks in the skin may be common.
- Horses can acquire MRSA from people or other horses. In colonized horses, MRSA is most often carried in the nose, so **direct hand-to-nose contact** between people and horses and **nose-to-nose contact** between horses are probably important routes of transmission. Horses may also acquire MRSA **indirectly** from other horses through contaminated surfaces such as feed bins, water bowls and fence rails.

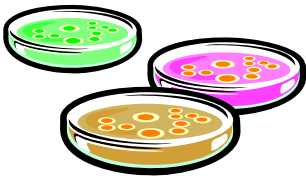


MRSA can survive **in the environment** for a limited period of time, but the bacteria are susceptible to most commonly used disinfectants, if the surface/equipment is cleaned properly before the disinfectant is applied. Proper **disinfection can be difficult on a farm** because of the different types of surfaces that are present. Consult your veterinarian about the best way to disinfect various surfaces on your farm.

What Happens If A Person Or A Horse Gets MRSA?

Most healthy people and horses that are exposed to MRSA have no problems at all – they may become colonized for a short time, or sometimes longer, often without ever knowing it. But in some cases, infection can occur.

- **Humans:** Infection is most common in individuals with a weakened immune system, who are hospitalized or who have breaks in the body's normal protective barriers (e.g. damaged skin, surgical incision). Infection with MRSA can cause a wide range of disease, from mild skin infections to life-threatening bloodstream infections, pneumonia or "flesh-eating disease". Serious MRSA infections are rare in non-hospitalized people in the general community – skin infections are most common in this group.
- **Horses:** The most common infections associated with MRSA tend to be skin infections, post-operative incisional infections, wound infections and joint infections. However, infection can occur in a wide range of tissues, and MRSA infections do not look any different than infections caused by other bacteria.



How is MRSA Diagnosed?

Because MRSA can cause so many different kinds of **infections**, and it's impossible to tell for sure what kind of bacteria are involved based on how the infection looks, MRSA in horses must be diagnosed based on bacterial culture, which can take 1-3 days to complete. Molecular tests are now being used in humans, which can detect MRSA more rapidly (hours versus days), but these tests are not currently used in animals.

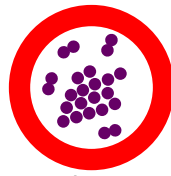
The body site most likely to be **colonized** with MRSA in humans is the nose, so a nasal swab is often cultured to check for MRSA colonization. Typically, the nose is also the site that is tested when horses are being screened for MRSA colonization, although this is rarely necessary except in equine hospitals or during outbreak investigations.

Molecular typing and classification of MRSA, which determines how closely related different strains are, is not routinely performed. This type of testing is typically only used for outbreak investigations or research.

How is MRSA Treated?

Infection: All MRSA strains are resistant to the entire family of beta-lactam antibiotics, including all penicillins and cephalosporins (e.g. ceftiofur (Excenel™ or Naxcel™)). Different MRSA strains may be resistant to other antibiotics as well; therefore, the bacteria must be tested in order to choose an antibiotic that will be effective. Automatically choosing the most powerful antibiotic to treat the infection when a more common drug will do can be very dangerous (and expensive), because the





MRSA, or other bacteria in the body, may become resistant to it, leading to MRSA infections that are even more difficult to treat. Despite the fact that MRSA is a multidrug resistant “superbug”, there is almost always at least one “simple” antibiotic that can be used to treat the infection, at least at this time. Local treatment of skin and soft tissue MRSA infections (e.g. lancing and flushing an abscess) is often very effective as well, and should not be overlooked, even if the person or animal is also treated with antibiotics.

Colonization: Decolonization therapy, including nasal ointment and/or oral antibiotics, is not needed or recommended for most people. It may be considered for people who are at higher risk for infection or in contact with individuals at higher risk for infection (e.g. HIV/AIDS, cancer, transplant patients).



Most if not all horses eliminate MRSA colonization on their own within a few weeks as long as they are not re-exposed to the bacterium – **decolonization therapy with antibiotics in horses is not needed or recommended**, but farm infection control practices (see below) are very important. Unnecessary use of antibiotics can lead to further development of antibiotic resistance, and can cause other problems such as antibiotic-associated diarrhea.

Infection Control For MRSA In Horses

In general, MRSA colonization is uncommon in healthy horses, but you can never tell if a horse is carrying MRSA just by looking at it. Similarly, MRSA colonization is more common than average in people that work with horses. It’s prudent to assume that you and/or your horse are MRSA carriers, and take appropriate measures to reduce the risk of transmission.



Wash Your Hands! Hand hygiene is the simplest and most practical way to prevent transmission of MRSA between humans and animals. Regular handwashing with **soap and water** or use of an **alcohol-based hand sanitizer** is perhaps the most important infection control measure for MRSA.

What Should I Do If My Horse Is Infected With MRSA?

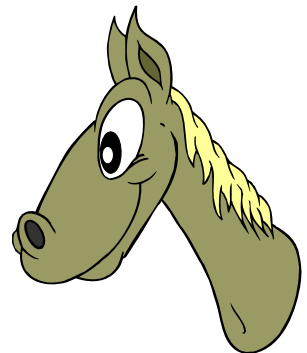
Don’t panic! The majority of MRSA infections can be treated effectively if they are diagnosed and appropriate treatment is started in a timely manner. A recent study reported that over 80% of hospitalized horses with MRSA infections survived to be discharged.

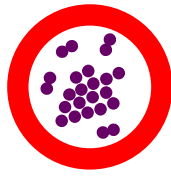
- Follow the treatment recommendations of your veterinarian very carefully. It is especially important to **completely finish any antibiotic prescriptions, as directed**, even if your horse seems to be better earlier.
- **Avoid contact with the infected area** of your horse. If possible, the area should be kept covered or bandaged. This also helps to prevent contamination of the environment and transmission to other animals or people. Wear gloves if you need to change the bandage and place all used bandage materials directly in the garbage.
- **Wash your hands** well after handling your horse, and especially after changing any bandages.
- **Infected horses are often colonized as well**, so also follow the recommendations for colonized horses below. Your horse may remain colonized in its nose or intestinal tract for a short period of time after the infection has resolved – even once the infection is gone, it does NOT automatically mean the horse is no longer infectious.

What Should I Do If My Horse Is Colonized With MRSA?

Horses that are colonized with MRSA should be considered possible sources of infection for other horses and people, and probably for other animals (e.g. dogs, cats) as well. High risk individuals, including young children, the elderly and individuals with a weakened immune system (e.g. HIV/AIDS, cancer or transplant patients), should not handle or come in contact with a colonized horse. It is also prudent to take extra precautions to prevent contact with horses that are sick or injured, that recently had surgery, mares in late pregnancy and very young foals.

- ▶ **Colonized horses should be isolated** to prevent transmission of MRSA by direct contact (i.e. horse-to-horse, horse-to-human) and indirect contact (via contaminated items such as water buckets, feed troughs, blankets and tack). Transmission through the air is not likely a problem, but a horse that coughs or sneezes could potentially spread MRSA over short distances.
 - Isolation strategies vary greatly between farms. Ideally, a colonized horse should be kept in a true isolation **barn** or **stall**, or in a barn without other horses. If this is not possible, keep the horse in a stall in an area with the lowest possible traffic (horse and human), and where there are no horses in the adjacent stalls.





- Do not allow colonized horses to stick their heads out doors or over dividers, in order to decrease the chance of nose contact with other horses or people.
- Horses can be isolated in their own **pasture** or **paddock**, as long as they don't have over-the-fence contact with other horses. MRSA can probably only live outside for a few days, but it is prudent to rest a paddock or pasture used by a colonized horse for a longer time (e.g. one week) before putting any other horses in it.
- ▶ Colonized horses should have their own feed buckets, water buckets, hay nets and other items, which should not come in contact with other horses. When no longer needed, or when the horse is no longer colonized, these items should be thoroughly disinfected or discarded.
- ▶ People should handle colonized horses using "**barrier precautions**." This is meant to reduce the risk of direct horse-to-person transmission of MRSA, and to reduce the risk of contamination of personal items (i.e. clothing).
 - A disposable gown, designated coveralls or other form of **protective outerwear** should be worn whenever a person has contact with the horse or goes into its stall (even if the person doesn't plan to touch the horse).
 - Some type of **overboot** (e.g. designated large rubber overboots, disposable plastic overboots) should be worn in the stall. Otherwise, footwear should be disinfected immediately when leaving the stall.
 - **Disposable gloves** should be worn for any contact with the horse, surfaces in its stall or objects in its environment. Gloves should be removed immediately upon leaving the horse's stall. Always **wash your hands** or use an alcohol-based hand sanitizer immediately after removing your gloves.
- ▶ Items such as blankets and wraps that might be contaminated should be washed in hot water and dried using hot air in a dryer. Hot water washing will not necessarily kill MRSA - **hot air drying** is probably the most important step.
- ▶ **Mark the horse's stall** clearly so people know that the horse is being isolated. This is particular important in public stables where many different people visit the barn on a daily basis.
- ▶ You can still train and ride your horse if it is colonized with MRSA, but prevent contact between your horse and other animals and people. The horse's **tack** should be considered contaminated after use and disinfected accordingly.



Testing or treating normal, healthy horses for MRSA is not necessary, There is no evidence that it is useful in any situation, even if a horse is colonized with MRSA. However, MRSA should be considered in horses if they develop infections, particularly of the skin and soft tissues and particularly if they are colonized with MRSA.

If I Have MRSA, What Should I Do About My Horse?

- ▶ **Wash your hands thoroughly** before and after handling your horse, to help prevent transfer of MRSA to your horse, and transfer of MRSA from your horse if it becomes colonized.
- ▶ **Do not kiss your horse**, and avoid touching your horse's nose.
- ▶ **Testing or treating normal horses for MRSA is not necessary**, even if a person in contact with the horse is infected or colonized with MRSA.

Is My Horse The Source Of My MRSA Infection?

Molecular classification of MRSA isolates is not performed routinely for sporadic cases of infection in humans or animals, which makes it very difficult to tell if a person may have acquired MRSA from their own horse or another horse, or if a horse acquired MRSA from a person or another horse. It's important to be aware that even healthy horses can carry MRSA, and that MRSA is relatively common in people who work with horses. Simple precautions like washing your hands can help prevent MRSA transmission from unknown carriers of the bacteria.

It is impossible to completely prevent horses (or people) from being exposed to MRSA, because so many people and animals carry MRSA without any signs. However, proper use of antibiotics according to the prescription, and *only* using antibiotics when they are *really* needed are likely very important measures.



Additional Information

- ▶ Centers for Disease Control and Prevention, 2008. Community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA). Available at: http://www.cdc.gov/ncidod/dhqp/ar_mrsa_ca.html.
- ▶ Centers for Disease Control and Prevention, 2007. Healthcare-associated methicillin-resistant *Staphylococcus aureus* (HA-MRSA). Available at: http://www.cdc.gov/ncidod/dhqp/ar_mrsa.html.