

## What Are MRSP & *Staphylococcus pseudintermedius*?

- *Staphylococcus pseudintermedius* is a bacterium that is commonly found on the skin or in the mouth, nose or intestinal tract of 50% of more of healthy dogs, and a smaller percentage of healthy cats. Typically it causes no problems at all, but it is an **opportunistic pathogen** - if an animal gets injured or sick for another reason, *S. pseudintermedius* can take advantage of the body's weakened defenses and cause infection and illness.
- This bacterium can infect almost any tissue, but **skin and soft tissue infections** are more common, particularly when the skin has been damaged by something else (e.g. allergies, scratching, chronic wetness, wounds, surgery). **Skin and ear infections** are also very commonly caused by *S. pseudintermedius*. Infections of other body sites and organs are much less common, but can be very severe.
- *Staphylococcus pseudintermedius* can also be found in the nose of up to 4% of healthy pet owners.
- **MRSP** stands for methicillin-resistant *S. pseudintermedius*, which is a form of *S. pseudintermedius* that is highly **resistant to many antibiotics**, including most of the drugs that are commonly used to treat bacterial infections in dogs and cats. Non-MRSP forms of *S. pseudintermedius* are methicillin-susceptible (MSSP).
- People and animals that carry MRSP without any signs of infection at all are said to be **colonized**. When **infection** with *S. pseudintermedius* (either MRSP or MSSP) occurs, this causes signs of inflammation (e.g. heat, pain, swelling, discharge, fever).



## What Are MRSI & *Staphylococcus intermedius*?

*Staphylococcus intermedius* is a bacterium that is **very closely related** to *S. pseudintermedius*. MRSI stands for methicillin-resistant *S. intermedius* which, similar to MRSP, is an antibiotic-resistant form of regular *S. intermedius*.



*Staphylococcus intermedius* was previously considered to be the most important *Staphylococcus* species in dogs and cats. In the past few years, it has been determined that what has typically been identified as *S. intermedius* in these species is truly *S. pseudintermedius*, and that ***S. intermedius* is actually extremely rare**.

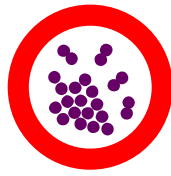
- Molecular tests are required to tell *S. intermedius* and *S. pseudintermedius* apart. Because identification is so difficult, some diagnostic laboratories still report isolation of *S. intermedius* from dogs and cats. It is almost certain that these bacteria are actually *S. pseudintermedius*. Fortunately, **this distinction does not have any impact on how to treat infection** with either bacterium.

## How Is MRSP Different From MRSA?

- Methicillin-resistant *Staphylococcus aureus* (MRSA) is the antibiotic-resistant form of *S. aureus*. Although *S. aureus* and *S. pseudintermedius* are related, MRSA and MRSP are very different.
- **In people, MRSA is a huge problem, but MRSP in people is only a minor concern.**
- **In dogs, MRSP is a major health problem but MRSA infections are much less common.**
- MRSA can infect both people and animals, and can be transmitted between people and pets relatively easily, in both directions. It appears that MRSP can also be transmitted from pets to people, but this seems to be quite uncommon. **Therefore, the zoonotic disease risk from MRSP in animals is low.**

## How Common Is MRSP In Dogs & Cats?

- Healthy animals can carry MRSP. One study found MRSP in 4.5% of healthy dogs and 1.2% of healthy cats. More recent studies indicate that a greater percentage of healthy dogs and cats are now carrying MRSP.
- MRSP infections appear to be increasing substantially in animals, particularly dogs. Veterinary dermatology specialists are reporting very large increases in MRSP skin infections (often called **pyoderma**). Infections after surgery are also becoming increasingly common, and they can be very difficult to treat.
- Anecdotal evidence indicates that MRSP infections are being identified in dogs and cats throughout the world, although published data to support this perception are not currently available.
- Risk factors for MRSP in pets are unknown. Antibiotic treatment is a potential risk factor.



## Can people get MRSP infections?

Yes, but this seems to be quite rare. There are only a couple of reported MRSP infections in people worldwide. Human infections with methicillin-susceptible *S. pseudintermedius* is also very rare, despite the fact that dog owners are probably exposed to the bacterium on a regular (if not daily) basis. This bacterium is apparently not well adapted to cause disease in people. While the risk is not zero, it's not a major concern.

## How Do Animals & People Get MRSP?

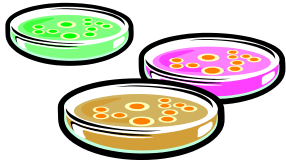
- MRSP is probably transmitted to pets by direct contact between animals. Healthy, colonized animals with no signs of infection are probably the major source of MRSP. Indirect transmission, which occurs when a person or animal gets MRSP from touching an object or surface that has been contaminated with MRSP by another animal, is theoretically possible but probably uncommon if it occurs at all.
- People most likely get MRSP from direct contact with an infected or colonized pet. It has been shown that people who regularly wash their hands after touching their pets less commonly carry *S. pseudintermedius* compared to people who don't regularly wash their hands. Transmission of MRSP from people to pets can also occur, although the risk of this is probably very low because MRSP in people is so uncommon.
- MRSP can survive **in the environment** for a limited period of time, but it's susceptible to most commonly used disinfectants, if the surface/equipment is cleaned properly first.



## What Happens If A Pet Gets Infected With MRSP?

- In dogs and cats, MRSP most commonly causes skin and ear infections. Wound infections, surgical site infections and other types of infection can also occur.
- Rarely, MRSP can cause severe disease like necrotizing fasciitis ("flesh-eating disease").
- While MRSP infections can be hard to treat, available evidence indicates that the outcome should not be any different for an MRSP infection compared to an MSSP infection *if* MRSP is promptly diagnosed and proper treatment is started right away. If MRSP is not diagnosed quickly and ineffective antibiotics are used, it is possible that more serious disease will result.

## How Is MRSP Diagnosed?

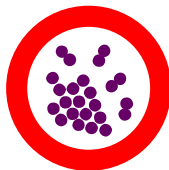


It is impossible to tell for sure what kind of bacteria are involved in any type of infection based on how the infection looks. MRSP is diagnosed based on bacterial culture, which takes a few days to complete. MRSP infections do not look any different from infections caused by MSSP or other staphylococcal bacteria. The only way to tell them apart is to culture the bacteria and test their susceptibility to antibiotics in a laboratory.

## How Is MRSP Treated?

**Infection:** All MRSP strains are **resistant to beta-lactam antibiotics** (e.g. penicillins, cephalosporins), but because different strains may be resistant to other antibiotics as well, the bacteria must be tested in order to choose the best antibiotic. 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 MRSP, or other bacteria in the body, may become resistant to it, and then there may be no drug that can effectively treat the infection. Local treatment of skin and soft tissue MRSP 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. Sometimes a strain of MRSP may be resistant to almost all available antibiotics, making selection of an appropriate antibiotic extremely difficult. In these cases your veterinarian may need to consult an infectious disease expert or pharmacology specialist to determine the best treatment.

**Colonization:** There is no information about when or how to eliminate MRSP from colonized animals. Because *S. pseudintermedius* evolved to live on dogs and cats, decolonizing these animals may be difficult or impossible. **Decolonization therapy with antibiotics is not recommended for animals colonized by MRSP** - it is highly unlikely to be effective and may lead to further bacterial antimicrobial resistance.



## What Should I Do If My Pet Has An MRSP Infection?

- **Relax.** Although MRSP infections can be very serious, most animals with MRSP infections can be treated quite successfully.
- **Follow your veterinarian's instructions.** Proper treatment right from the start is very important. Make sure you follow all treatment recommendations. Always ensure that dosing and timing of medications are followed exactly. It is especially important to **completely finish any antibiotic prescriptions, as directed**, even if your pet seems to be better before they're done.
- **Avoid contact with the infected area** of your pet. If possible the area should be kept covered or bandaged to reduce the risk of transmission and contamination of the environment. Follow all bandaging instructions from your veterinarian very carefully. If you need to change a bandage, wear gloves and put the dirty bandage directly in the garbage.
- **Wash Your Hands!** Hand hygiene, using **soap and water** or an **alcohol-based hand sanitizer**, is the simplest and most practical way to prevent transmission of MRSP between animals and people. In general, MRSP colonization is uncommon in healthy pets, but it is possible that any given animal is carrying MRSP at any time. Therefore, *hand hygiene is important for everyone after handling any animal*, but it is particularly important for individuals who may have a weakened immune system. It is also especially important after handling an animal with an active MRSP infection, because the risk of contamination with MRSP is greater.
- **Strict quarantine is not necessary.** MRSP is widespread in the dog population, so really aggressive measures to restrict contact with an infected animal in the community aren't indicated. However, use common sense to help reduce the likelihood of transmission of MRSP to other dogs (and people) by:
  - Avoiding dog parks, puppy classes and other similar events while the infection is still active.
  - Not letting your dog off-leash, as it may then have uncontrolled contact with other dogs.
  - Promptly removing any stool that is passed, particularly in public places, since MRSP can be shed in stool.
  - Keeping your dog away from people with compromised immune systems.
- **Assume that your pet is also carrying MRSP at other body sites**, not just where it has the infection. You should therefore also following the basic practices recommended below for colonized pets.



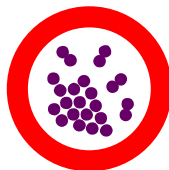
## What Should I Do If My Pet Is Colonized With MRSP?



- Avoid contact with the pet's nose, mouth or bum, as these are the most likely areas to harbour MRSP.
- Don't let your pet lick a person's face, or any area of broken or damaged skin.
- MRSP-positive dogs should be walked in low-traffic areas, where they are not likely to encounter other animals or people to which they may transmit MRSP through direct contact. MRSP-positive cats should be kept indoors.
- MRSP can be found in the stool of colonized animals, so stool should be collected as promptly as possible and disposed of directly into the garbage. Cat litter boxes should be scooped out daily.
- Although the importance of the environment in transmission of MRSP is unclear, MRSP can survive in the environment for some time. The toys and bedding of an MRSP-positive pet should regularly be changed/cleaned to reduce the exposure of both the animal and people to MRSP. Contaminated laundry should be washed separately and dried in a hot air dryer (such as most normal clothes dryers).
- It's probably also a good idea to keep MRSP-positive animals off of people's beds.
- **Hand hygiene remains the most important means of preventing transmission.**

## How Long Will My Pet Be Colonized With MRSP?

There is no information about how long animals remain colonized with MRSP, but long-term colonization is likely possible, because we know *S. pseudintermedius* is well adapted to live on pets (especially dogs). This is quite different from MRSA, which pets only seem to carry for a short period of time if they become colonized.

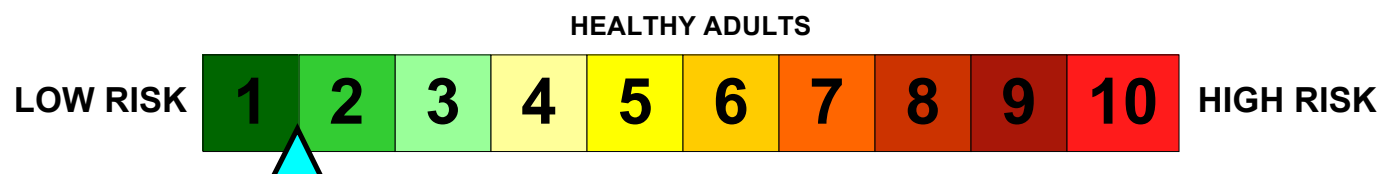


## How Do I Prevent My Pet From Getting MRSP?

- It's impossible to completely prevent exposure to MRSP in pets because it is carried by so many healthy animals (and a few healthy people).
- Risk factors for MRSP colonization and infection in pets are not well known. One important step for preventing MRSP from emerging is using antibiotics responsibly.
  - Always follow prescriptions (for you or your pet!) as carefully as possible. Give the right dose at the right time, and finish the entire prescription, unless directed otherwise by your veterinarian.
  - Only use antibiotics when they're really needed, and only if your veterinarian advises their use.

## What Is The Risk?

The zoonotic risk to the general population posed by MRSP in *healthy* house pets such as dogs and cats is:



**Individuals with compromised immune systems** (e.g. HIV/AIDS, transplant and cancer patients) are more susceptible to many kinds of infections, including those which may be transmitted by pets. While these individuals are not advised to get rid of their pets, precautions should be taken to reduce the frequency of contacts that could result in pathogen transmission (e.g. avoiding contact with open wounds, feces), as well as the ability of infectious agents to survive in the household (e.g. prompt and thorough disinfection of potentially contaminated surfaces).

- Immunocompromised individuals should avoid contact with any pet that is colonized or infected with MRSP.

**Infants and young children** (less than 5 years old) are more likely than adults to extensively handle animals if given the opportunity, more likely to touch their faces or mouths, and less likely to wash their hands after handling an animal. Children may "snuggle" with pets; this very close contact can increase the risk of disease transmission.

- Young children should be supervised when playing with animals, and an adult should ensure that they wash their hands afterwards, and especially prior to handling food. Older children should be taught to do the same.

For these groups, the zoonotic risk posed by MRSP in *healthy* house pets such as dogs and cats is likely:

