

Rhodococcus equi

R. equi is a bacterium that lives in the soil and can cause severe pneumonia and other problems in foals

Overview

Rhodococcus equi an important pathogen (disease-causing organism) in the equine industry worldwide. It is an ubiquitous, hardy, intracellular, gram-positive bacterium well known for its ability to cause severe pneumonia in young foals.¹

In addition, *R. equi* can cause a myriad of extrapulmonary diseases, including septic arthritis (infection of joints), osteomyelitis (infection of bones), neonatal diarrhea (enterocolitis), abdominal lymphadenitis (inflammation of the lymph nodes), abdominal and spinal cord abscesses, hepatitis, and immune-mediated disease such as polysynovitis.² *R. equi* can also cause sudden death in foals that appear to be healthy.

Foals are thought to become infected when they ingest or breathe in soil, dust, and fecal particles harboring the bacteria within the first few days of life.¹ The bacteria then multiply inside macrophages (a type of white blood cell that normally kill bacteria). Clinical signs of disease typically manifest at approximately 30-60 days of age or later.¹

While most foals are exposed to *R. equi*, not all foals develop disease. It remains unclear why some foals develop pneumonia caused by the pathogenic strains of *R. equi* while other foals do not. It is likely that a combination of the foal's immune status, environmental factors, and farm management practices all play a role.

Clinical Signs

Common clinical signs of *R. equi* pneumonia include cough, a mucopurulent (thick, greenish-white) nasal discharge, high fever, lethargy, depression, weight loss, an increased respiratory rate, and progressive respiratory distress. On auscultation of the lungs, crackles and wheezes are easily noted in both lungs.¹



Foals are thought to become infected with *R. equi* when they ingest or breathe in the bacteria in soil, dust, or fecal particles.

Pneumonia is a common medical condition in foals and is a major cause of illness and death in this age group. Thus, *R. equi* should be suspected in any appropriately aged foal (between one and six months) with the above-described clinical signs. *R. equi* must be differentiated from other causes of pneumonia, including respiratory tract infection due to other bacteria or infection with other microorganisms such as fungi. In many cases the causative organism(s) of undifferentiated respiratory tract infections is/are not identified.

Foals with extrapulmonary diseases associated with *R. equi* will present with a different spectrum of clinical signs depending on the affected organ(s). For example, foals with osteomyelitis or spinal abscessation could present with lameness or ataxia.³

Diagnosis

Despite the challenges associated with achieving a timely diagnosis of *R. equi*, early identification of affected foals is essential due to the high prevalence and

mortality rates (approximately 28%), economic losses, and potential negative impact on future athletic performance in recovered foals.

At present, the “gold standard” tests for *R. equi* include bacterial culture or polymerase chain reaction (PCR, a DNA-based test) and analysis of a transtracheal aspirate—a procedure that involves passing a thin, sterile tube down the trachea to the lungs to obtain a sample of cells and bacteria.^{1,3}

More specifically, a positive diagnosis of *R. equi* is achieved in young foals with clinical signs consistent with *R. equi* that have evidence of pulmonary abscesses on radiographs (X rays) and ultrasound and a positive *R. equi* culture from a sample obtained by a transtracheal aspirate. Routine blood work typically yields non-specific results, including high fibrinogen levels (a marker of inflammation) and a high white blood cell count.

Early diagnosis before the development of clinical signs could reduce losses and decrease treatment-related costs. Thoracic ultrasound examinations in foals performed every two weeks could detect subclinical (when clinical signs are not yet apparent) *R. equi* pneumonia in foals, thereby permitting early treatment.¹

Treatment

The treatment of choice for foals diagnosed with *R. equi* is long-term antibiotic therapy, most commonly a combination of one of the erythromycin family of antibiotics and rifampin.¹ These antibiotics penetrate the lung abscesses and the macrophages where the bacteria live and multiply.³

Treatment is recommended for at least 30 days, but it can last as long as six to eight weeks or more. Fibrinogen levels and radiographs are used to help determine when to stop treatment.

Foals are administered the antibiotics until there is no longer any evidence of pneumonia on repeat radiographs or ultrasound exams. Antibiotic-associated side effects for the foal include hyperthermia (markedly elevated body temperature) and a mild diarrhea that is usually self-limiting. In some cases the foal might require a short interruption in erythromycin (or similar antibiotic) administration until the diarrhea subsides.

In contrast, dams of affected foals can develop a potentially fatal diarrhea that is thought to be caused by ingestion of the active erythromycin metabolite either by drinking water contaminated with erythromycin from the foal or by ingesting the foal's feces.

Prevention

R. equi is a hardy bacterium that is a difficult to control. At present, no vaccine is available against *R. equi*.

The only proven preventive medical strategy is the intravenous administration of *R. equi* hyperimmune plasma (HIP), which contains high levels of antibodies (immunoglobulins) against *R. equi*.

Hyperimmune plasma is thought to provide passive immunity to treated foals against *R. equi* and reduces the incidence of pneumonia caused by this bacterium; however, hyperimmune plasma is expensive, labor-intensive to administer, and not universally effective.


Texas A&M researchers previously found that azithromycin reduced the incidence of *R. equi* pneumonia in foals; however, there is concern for antimicrobial resistance.

Studying the efficacy of other agents for controlling *R. equi* pneumonia in foals is ongoing. A recent study showed gallium maltolate administered orally for the first two weeks of life was not effective at reducing the incidence of *R. equi* pneumonia among foals at endemic breeding farms.⁴

In the meantime, good farm management and sanitation strategies are advocated to help minimize infection. Mares and foals can be kept on grassy pastures rather than dry, dusty paddocks to avoid ingestion or inhalation of soil, dust, and fecal particles harboring the bacteria. Remove feces frequently to minimize bacterial exposure. Compost manure appropriately to reduce populations of the bacterium.⁵

Risk for Humans

R. equi can be a zoonotic disease, meaning it can be transmitted between animals and people.

In general *R. equi* tends to only cause disease in immunocompromised humans, such as those with human immunodeficiency virus (HIV) or acquired immunodeficiency syndrome (AIDS). 

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Authored by Dr. Stacey Oke; reviewed by Dr. Fairfield T. Bain.