GUIDELINES ON STRANGLES

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The Disease

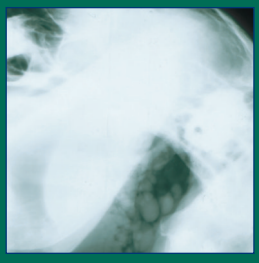
Strangles is a disease of the lymph nodes of the equine upper respiratory tract. It is caused by the bacterium *Streptococcus equi (S. equi)* and is endemic within the horse population of the United Kingdom.

Notification Procedures

There are no legal notification requirements for strangles in the UK, although it is advisable to inform the national breeders' associations if infection occurs. Under the Rules of Racing (Section C30 Duty to report communicable diseases), racehorse trainers are obliged to report likely or confirmed strangles to the British Horseracing Authority (BHA) when it occurs among horses in training.

Clinical Signs

Affected horses typically have a high temperature, cough, poor appetite, nasal discharge and swollen or abscessed lymph nodes of the head, which can appear as open sores. Some infected horses may become very ill and the disease may become fatal if the bacterium spreads to other parts of the body ('bastard strangles') or the respiratory tract is occluded by swollen lymph nodes (hence the term 'strangles'). However, in some horses, a nasal discharge without glandular swelling is sometimes all that is seen.



Transmission of Disease

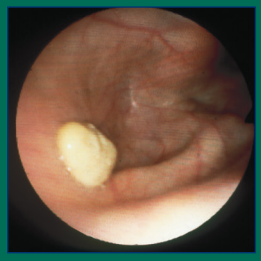
Direct contact between infected horses is the most obvious means of transmitting the infection but the hands and equipment of staff, farriers or veterinary surgeons can spread it indirectly. The bacterium is discharged (shed) from draining abscesses and the nose, and it may survive in the environment, particularly in water troughs. Good hygiene is therefore essential in controlling the disease. The incubation period is usually about one week but may be longer. Horses incubating the disease may shed *S. equi* before the onset of obvious clinical signs and so may spread the infection to in-contacts before the first case becomes apparent.

A small but important proportion of horses that have recovered from strangles become persistently infected (most commonly in their guttural pouches) with *S. equi* for months or even years. These 'carriers' are less susceptible to reinfection, and they

may have no obvious clinical signs of disease but can intermittently shed *S. equi*, which can then infect naive horses. These subclinical carriers are probably the most important factor in persistence of infection on premises between outbreaks and can initiate new outbreaks following their inadvertent movement to new premises.

Prevention

A live attenuated strangles vaccine, first licensed in the UK in 2005 and administered by submucosal injection, has been returning to the market in Europe since 2010, with its availability in different countries occurring at different times. Veterinary advice should be sought to determine whether the vaccine is available and whether its use may be appropriate on the basis of a specific risk assessment.



Ideally, all horses entering any stud or stable premises should be quarantined for a period of 3-4 weeks and monitored closely, particularly in the period immediately after arrival. Any horse that develops a nasal discharge or other signs consistent with strangles should be isolated and tested for the presence of, or exposure to, *S. equi.*

The strangles blood test can be used to identify horses that have elevated antibody responses to *S. equi* and have been exposed to this pathogen in the recent past, enabling the identification of potentially infectious animals before or immediately after movement. A further blood test at the end of the quarantine process can be used to identify animals that may have seroconverted since their arrival, consistent with recent exposure to *S. equi*. It is recommended that in order to prevent inadvertent introduction of strangles onto a premises employing quarantine measures that any quarantine batches that include seropositive animals, as well as those seroconverting whilst in quarantine, not be released until their infectious status has been shown to be negative for presence of *S. equi* (see Diagnosis below).

Diagnosis

Strangles is diagnosed either directly by detection of *S. equi* itself or indirectly by detection of rising levels of antibody against *S. equi* in blood samples, although presence of antibodies against *S. equi* does not necessarily indicate that an animal is still infectious to other horses.

Direct detection of *S. equi* is either by laboratory isolation or by qPCR detection of its DNA from nasopharyngeal swabs, abscess contents and/or guttural pouch washes. It should be noted that low bacterial numbers, the concurrent presence of the closely related *S. zooepidemicus* or recent antibiotic treatment, may make the detection of *S. equi* by culture more difficult and less sensitive than qPCR.

When taking nasopharyngeal swabs, it is particularly important to sample the back of the pharynx around the opening of the gutteral pouch, using

specially designed elongated swabs with enlarged absorbent heads[1]. There is no need to use smaller, guarded swabs as the main purpose of swabbing for strangles is to optimise the chances of detecting the organism if it is present. Shedding of *S. equi* into the nasopharynx often occurs intermittently, so repeated swabbing is recommended to confirm negative results. *S. equi* should be more reliably confirmed or excluded following testing by qPCR or culture and qPCR of frank pus from obvious draining abscesses.

The carrier state may be diagnosed or excluded by sequential nasopharyngeal swabs or, preferably, endoscopic examination ('Scoping') of the guttural pouches and submission of guttural pouch washes for testing by qPCR alone or by culture and qPCR. A series of three nasopharyngeal swabs, collected one week apart, will result in detection, by positive qPCR, on at least one of the swabs in >90% of carrier horses. As the sensitivity of *S. equi* detection for identifying guttural pouch carriers on three nasopharyngeal swabs is broadly equivalent to testing bilateral guttural pouch samples and a single nasopharyngeal swab taken on the same one occasion, the latter approach is the recommended sampling protocol for determining infectious status in seropositive, asymptomatic horses.

Although carriers only shed *S. equi* intermittently, over 90% of carriers maintain specific antibodies in their blood. These antibodies can be detected by a blood ELISA test, which may provide a useful tool to help identify carrier animals. Newly exposed horses take at least two weeks to develop sufficient antibodies to give a positive blood ELISA result and may remain positive for up to six months after recovery. As with all ELISA tests, false negative (7% based on 93% sensitivity) and false positive (<1% based on >99% specificity) results may occur (Robinson et al., 2013). Therefore, results must be interpreted carefully and in the context of the specific situation in which they are being used. Your veterinary surgeon may obtain a more detailed description of the use and interpretation of the strangles blood test from the testing laboratory.

Control of Infection

More details on methods for control and eradication of strangles on equine premises are available in the 'Strategy to eradicate and prevent Strangles (STEPS)' document, which is accessible at https://www.sruc.ac.uk/download/downloads/id/1489/steps_guidelines.pdf

The spread of *S. equi* may be limited by the early detection of shedders among newly affected horses and their in-contacts by appropriate testing (see above). Any suspected cases should be isolated immediately.

Young and elderly horses are most susceptible to infection and should be monitored closely. All infected horses and their in-contacts should remain in strict isolation, under the direction of the attending veterinary surgeon, and with the highest possible standards of hygiene.

Regular disinfection of water troughs should be performed in order to minimize the infectious dose that in-contact horses receive and so reduce the severity of disease.

Horses should not enter affected premises unless they can be kept in strict isolation from all possible sources of infection. No infected or in-contact animal should be released from isolation or veterinary supervision until they have been tested conclusively negative for active shedding and the carrier state, as described above.

Treatment

The treatment of horses with clinical signs of strangles remains controversial and any essential treatment will be determined by the attending veterinary surgeon, who will be best placed to consider all relevant risks. For further advice regarding the treatment of carrier horses please consult the attending vet.

Confirmation of Freedom from Disease

Shedding of *S. equi* usually ends rapidly after complete recovery but may continue intermittently for several weeks after clinical signs have resolved in some carrier horses. Therefore, no convalescent horse or in-contact can be considered free from infection until either three negative nasopharyngeal swabs have been obtained or the horse has been tested negative on bilateral guttural pouch samples and a single nasopharyngeal swab taken on the same one occasion. Negative results indicate freedom from infection and the carrier state in the large majority of cases, but not all, so vigilance must be maintained. In deciding on the best time to commence testing to confirm freedom from infection after an outbreak of strangles it should be noted that this is likely to be a trade-off between starting sooner and finding a proportion of convalescing horses that continue to harbour *S. equi* that would if left longer have cleared the infection naturally and starting later and identifying fewer true subclinical *S. equi* carriers that require treatment and re-testing. Experience suggests that the best compromise is for clearance testing to commence at least four weeks after the last clinical signs of strangles have been observed.

Testing horses prior to their introduction to new premises

More details on methods for prevention of introduction of strangles onto equine premises are available in the 'Strategy to eradicate and prevent Strangles (STEPS)' document https://www.sruc.ac.uk/download/downloads/id/1489/steps_guidelines.pdf

Horses entering new premises should be quarantined for 3-4 weeks in case they are incubating diseases such as equine influenza or strangles. With strangles,

infected horses may or may not have clinical signs or they may be subclinical carriers. All new arrivals should be examined for signs of illness (high temperatures, dullness, not eating, nasal discharge, swollen or abscessed lymph glands around the head or neck). Any horses with such signs should be immediately isolated and veterinary advice sought.

Routine use of the strangles ELISA blood test during isolation can identify previously infected and potentially infectious horses quickly. Ideally samples should be taken on arrival and after three weeks isolation to check for rising antibody levels (seroconversion) indicating an immune response after exposure to *S. equi*. If any of the quarantined horses are ELISA blood test positive on either the first or second test then further swab/wash testing (using qPCR or culture and qPCR) is required in order to determine whether the positive animals are carrying *S. equi* (see Diagnosis above).

Export Certification

Strangles is not notifiable by law. However, no horse with clinical signs or recent contact with this disease should be exported.

Testing horses at the end of a strangles outbreak

Following an outbreak of strangles, the best time to detect a carrier horse is a minimum of 30 days after the last clinical signs are seen. Shedding usually ends rapidly after recovery although it may continue intermittently in some horses.

Further information for veterinary surgeons

[1]Swabs with extra long shafts and an enlarged absorbent head can be obtained by emailing equinesurveillance@gmail.com

Strategy to eradicate and prevent Strangles (STEPS): https://www.sruc.ac.uk/download/downloads/id/1489/steps_guidelines.pdf

Triplex qPCR for detection of *S. equi*: http://www.sciencedirect.com/science/article/pii/S1090023312003103

ELISA blood test for detecting response to exposure to *S. equi*: http://www.sciencedirect.com/science/article/pii/S1090023313000567