

GLANDERS

Background:

Glanders is caused by *Burkholderia mallei*, a gram-negative bacillus. This is a zoonotic disease of horses, mules and donkeys. Human infection has occurred almost exclusively in occupations which have contact with animals or work in laboratories (e.g., veterinarians, equine butchers and pathologists). Glanders has not occurred in the United States since the 1940s. As a bioweapon, it would be dispersed as an aerosol. Glanders can occur from a cutaneous infection, upper respiratory infection and/or pulmonary infection. Human cases may have a combination of all three syndromes.

Incubation Period:

Usually 10 to 14 days after inhalational exposure of the organism.

Signs/Symptoms:

- 1) Cutaneous infection: Caused by invasion of abraded or lacerated skin; the patient will have nodules and ulcerations at site of infection. A chronic form of this disease may have lymphangitis with eruptions and ulcers along the lymphatic system. This form may spread to develop the septicemic form.
- 2) Upper respiratory infection: The patient will present with mucopurulent discharge from the oral, nasal and/or conjunctival mucosa. There may be nodules and ulcers on the septum and turbinates. This form may spread to develop the septicemic form.
- 3) Pulmonary infection: Patients will have dyspnea, bronchopneumonia, lobar or segmental pneumonia and necrotizing nodular lesions.
- 4) Septicemic form: This stage begins suddenly with fever, rigors, sweats, myalgias, pleuritic chest pain, photophobia, lacrimation and diarrhea. Physical examination may reveal fever, tachycardia, cervical adenopathy and mild splenomegaly. Blood cultures are usually negative until the patient is extremely ill. Mild leukocytosis with a shift to the left or leukopenia may occur. This form usually is fatal within 7 to 10 days.

Laboratory and Diagnostic Testing:

Call the local department of health and IDPH to inform the state of a possible glanders-infected patient and to obtain additional instructions for diagnostic testing. Specimen collection should occur before the administration of antibiotics.

- 1) Chest x-ray: Look for miliary nodules (0.5-1.0 cm), small multiple lung abscesses, bronchopneumonia, lobar pneumonia, necrotizing nodular lesions.
- 2) Labs:
 - a) Gram stain of lesion exudates may reveal scant small bacilli with methylene blue stain.
 - b) Blood, sputum or urine culture (may grow rapidly on meat nutrient mediums and other specialized mediums).
 - c) CBC - mild leukocytosis with left shift (and bandemia) may be seen.
 - d) Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) may be elevated.

Treatment:

Isolation of infected individuals will be necessary to prevent human-to-human spread. Treatment is based on animal and in vitro studies, as naturally-occurring human disease is so rare. Various isolates may have marked variability in resistance pattern and treatment will need to be amended as necessary.

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Localized disease without systemic symptoms:

Can use either:

1) Amoxicillin/Clavulanate 60 mg/kg/dose divided TID (for local disease or mild toxicity)

or

2) TMP/SMX (Trimethoprim/sulfamethoxazole) with TMP 4 mg/kg/dose and SMX 20 mg/kg/dose divided BID **or**

3) Tetracycline 40 mg/kg/day divided TID (for adults and children > 8 years old)

The duration of treatment should be 60 to 150 days.

Localized disease with mild systemic symptoms:

1) Using a combination of two of the above oral regimens is recommended for 30 days, followed by monotherapy with either amoxicillin/clavulanate or TMP/SMX for 60 to 150 days.

2) If extra-pulmonary suppurative disease is present, therapy should continue for 6 to 12 months. Surgical drainage of abscesses may be required.

For severe systemic disease:

1) Ceftazidime IV, 120 mg/kg/day divided TID combined **with**

2) TMP/SMX (TMP 8 mg/kg/day and SMX 40 mg/kg/day) divided QID for 2 weeks. This regimen should be followed by 6 months of oral therapy.

Animal models show that doxycycline, rifampin and ciprofloxacin may also be effective in the treatment of glanders.

Prophylaxis:

No vaccine exists for glanders. Prophylaxis may be attempted with TMP/SMX, but efficacy of treatment, as well as dose and duration treatment, is unknown.