

# GUIDELINE for *Pasteurella multocida* infection

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The *Pasteurella* infection guidelines were first published in the J Feline Med Surg 2013; 15: 570-572 by Albert Lloret. The guidelines were updated by Tadeusz Frymus 2019 and 2022.

## Key points

- *Pasteurella* are part of the normal oral and respiratory tract flora of cats.
- However, these bacteria are commonly isolated from feline subcutaneous abscesses, pyothorax, respiratory tract diseases or other conditions, usually as a secondary agent.
- Diagnosis is not difficult, as *Pasteurella* grows readily in routinely used bacterial culture media.
- Penicillins and potentiated beta-lactams are first line antibiotics in both, cats and humans. Feline isolates are also highly sensitive to quinolones.
- Bites, scratches or even only close contact may transmit *Pasteurella* to humans. Signs of local infection may appear in 3 to 6 hours. Severe infections, septicaemia and peritonitis may occur in immunocompromised, and less frequently in immunocompetent persons in contact with cats. Cat ownership by immunocompromised persons may carry a risk.

## Agent properties

*Pasteurella multocida*, a gram-negative, facultative anaerobic, non-spore-forming pleomorphic coccobacillus, is a commensal bacterium and part of the natural flora in the nasopharynx and upper respiratory tract of the cat (Freshwater, 2008; Dolieslager et al., 2011).

## Epidemiology and pathogenesis

*Pasteurella multocida* is a common commensal or opportunistic pathogen of the oral cavity and/or respiratory tract of cats (Wilson and Ho, 2013). In one study a 90% carrier state in gingival margins was shown (Freshwater, 2008). The bacteria may be involved in disease in cases of preexisting or coinfection with other agents, as well as secondary to trauma, immunosuppression or other predisposing factors (Mavrides et al., 2022; Moon et al., 2022).

Several *Pasteurella* species have been associated with human infections, *P. multocida* subsp. *multocida*, *P. canis*, *P. multocida* subsp. *septica*, *P. multocida* subsp. *gallicida*, *P. stomatis* and *P. dagmatis* (Garniere et al., 1993; Wilson and Ho, 2013).

## Clinical signs in cats

*Pasteurella multocida* is one of the most frequent pathogens in infected skin wounds and subcutaneous abscesses (Roy et al., 2007). It is also a common bacterium involved in respiratory tract infections. An analysis of bacteria isolated from 231 feline patients suffering from respiratory tract infections in different European countries revealed that the most commonly found organism was *P. multocida* (36.4 % of all isolates) (Moyaert et al., 2019). It is also one of the common bacteria causing pyothorax in cats (Ottenjann et al., 2008; Barrs et al., 2005; Walker et al., 2000; Sim et al., 2021). A post-mortem study of 69 lethal cases of feline pneumonia has been performed recently in Austria (Schmal-Filius et al., 2020). The lungs were positive for at least one infectious agent in 42 (61%) of these cases, and in a high proportion of the samples (35%) *P. multocida* was involved. *Pasteurella* has been associated with spinal empyema

and meningo-encephalomyelitis (Messer et al., 2006; Granger et al., 2007; de Cecco et al., 2021). *Pasteurella* spp. infection may also result from urinary catheterization in feline urethral obstruction (Cooper et al., 2019).

## Diagnosis

Diagnosis is made based on bacterial culture from infected tissues or secretions. *Pasteurella* grows readily on chocolate and sheep-blood agar media, but fails to grow on MacConkey agar, the usual medium for Gram-negative bacteria. Strains are usually catalase-, oxidase-, indole- and sucrose-positive.

## Treatment and prevention

Penicillins and potentiated beta-lactamics (amoxicillin-clavunilate potassium) are first line antibiotics for the treatment of *Pasteurella* infections (Roy et al., 2007; Freshwater, 2008; Perez Garcia et al., 2009). Quinolones, cephalosporins and modern macrolids are also indicated (Freshwater, 2008). All 84 *P. multocida* isolates from cats suffering from respiratory tract infections in Europe were fully susceptible to pradofloxacin, and also highly susceptible to enrofloxacin and marbofloxacin (Moyaert et al., 2019). Also, in a recent study performed in Spain *Pasteurella* isolates from feline respiratory tract were highly sensitive to a broad spectrum of tested antimicrobials (Li et al., 2021). The same has been found in isolates derived from the skin of cats in 12 European countries (de Jong et al., 2020). In Canada almost 100% of 309 feline isolates were sensitive to trimethoprim-sulfamethoxazole, penicillin, enrofloxacin, doxycycline, cefovecin, cephalixin, amoxicillin-clavulanate, and ampicillin, however only 66% to gentamicin, 46% to amikacin, and 36% to erythromycin (Awosile et al., 2018). In severe cases, the therapeutic decision must be based on antibiotic susceptibility tests.

## Zoonotic risk

Severe infections are usually seen in children, pregnant women, patients on chronic immunosuppressive therapy, and immunocompromised persons. Chronic liver disease and cirrhosis entail a special risk of sepsis and peritonitis by *Pasteurella* spp. (Adler et al., 2011; Hey et al., 2012). Although severe disease generally appears in immunocompromised persons, about one third of septicaemic patients were previously healthy individuals (Kimura et al., 2004).

Cat bites frequently become infected (20 to 80%), and *P. multocida* is the most commonly cultured bacterium from infected bite wounds (Freshwater, 2008; Bula-Rudas et al., 2018). Apart from bites, scratches and licks, close contact has also been sufficient for infection. Inhalation of secretion droplets from the upper respiratory tract is also a possible source of infection (Kimura et al., 2004).

*P. multocida* infection typically produces cellulitis and/or abscesses at the site of the bite or scratch, usually 3 to 6 hours after inoculation (Westling et al., 2000; Perez Garcia et al., 2009). Occasionally, the local infection can progress to necrotising fascitis, septic arthritis and osteomyelitis (Layton, 1999).

Respiratory infection, including pneumonia and bronchopneumonia also are common, mostly in patients with pre-existing lung disease (Perez Garcia et al., 2009).

Less frequently, a disseminating infection may produce septicaemia, which may lead to septic shock, meningitis, endocarditis, peritonitis, arthritis and other serious consequences (Perez Garcia et al., 2009).

*Pasteurella* peritonitis through a dialysis catheter after contact with a cat has been reported (Rondon-Berrios and Trebejo-Nunez, 2010; Sol et al., 2012).

High prevalence of the bacterium is an indication for the use of prophylactic antibiotic therapy (amoxicillin with clavulanic acid) after a cat bite (Freshwater, 2008; Wilson and Ho, 2013).

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## References

- Adler AC, Cestero C, Brown RB (2011): Septic shock from *Pasteurella multocida* following a cat bite: case report and review of the literature. *Conn Med* 75, 603-605.
- Awosile BB, McClure JT, Saab ME, Heider LC (2018): Antimicrobial resistance in bacteria isolated from cats and dogs from the Atlantic Provinces, Canada from 1994-2013. *Can Vet J* 59(8), 885-893. PubMed PMID: 30104781; PubMedCentral PMCID: PMC6049328.

- Barrs VR, Allan GS, Martin P, Beatty JA, Malik R (2005): Feline pyothorax: a retrospective study of 27 cases in Australia. *J Feline Med Surg* 7, 211-222.
- Bula-Rudas FJ, Olcott JL (2018): Human and Animal Bites. *Pediatr Rev* 39(10), 490-500. doi: 10.1542/pir.2017-0212. Review. PubMed PMID: 30275032. Cooper ES, Lasley E, Daniels JB, Chew DJ (2019): Incidence of bacteriuria at presentation and resulting from urinary catheterization in feline urethral obstruction. *J Vet Emerg Crit Care (San Antonio)*. 2019 Jun 27. doi:10.1111/vec.12870. [Epub ahead of print] PubMed PMID: 31250535.
- de Cecco BS, Carossino M, Del Piero F, Wakamatsu N, Mitchell MS, Fowlkes NW, Langohr IM. Meningoencephalomyelitis in domestic cats: 3 cases of *Pasteurella multocida* infection and literature review. *J Vet Diagn Invest*. 2021 Nov;33(6):1156-1162. doi: 10.1177/10406387211034484. Epub 2021 Jul 23. PMID: 34301172; PMCID: PMC8546483.
- Dolieslager SM, Riggio MP, Lennon A, Lappin DF, Johnston N, Taylor D, Bennet D (2011): Identification of bacteria associated with feline chronic gingivostomatitis using culture-dependent and culture-independent methods. *Vet Microbiol* 148, 93-98.
- Freshwater A (2008): Why your housecat's trite little bite could cause you quite a fright: a study of domestic felines on the occurrence and antibiotic susceptibility of *Pasteurella multocida*. *Zoonoses Public Health* 55, 507-513.
- Ganiere JP, Escande F, Andre G, Larrat M (1993): Characterization of *Pasteurella* from gingival scrapings of dogs and cats. *Comp Immunol Microbiol Infect Dis* 16, 77-85.
- Granger N, Hidalgo A, Leperlier D, Gnirs K, Thibaud JL, Delisle F, Blot S (2007): Successful treatment of cervical spine epidural empyema secondary to grass awn migration in a cat. *J Feline Med Surg* 9, 340-345.
- Hey P, Gow P, Torresi J, Testro A (2012): Cirrhosis, cellulitis and cats: a "purrfect" combination for life-threatening spontaneous bacterial peritonitis from *Pasteurella multocida*. *BMJ Case Rep*; epub ahead of print.
- de Jong A, Youala M, El Garch F, Simjee S, Rose M, Morrissey I, Moyaert H. Antimicrobial susceptibility monitoring of canine and feline skin and ear pathogens isolated from European veterinary clinics: results of the ComPath Surveillance programme. *Vet Dermatol*. 2020 Dec;31(6):431-e114. doi: 10.1111/vde.12886. Epub 2020 Sep 13. PMID: 32924232.
- Kimura R, Hayashi Y, Takeuchi T, Shimizu M, Iwata M, Tanahashi J, Ito M (2004): *Pasteurella multocida* septicemia caused by close contact with a domestic cat: case report and literature review. *J Infect Chemother* 10, 250-252.
- Layton CT (1999): *Pasteurella multocida* meningitis and septic arthritis secondary to a cat bite. *J Emerg Med* 17, 445-448.
- Li Y, Fernández R, Durán I, Molina-López RA, Darwich L. Antimicrobial Resistance in Bacteria Isolated From Cats and Dogs From the Iberian Peninsula. *Front Microbiol*. 2021 Jan 20;11:621597. doi: 10.3389/fmicb.2020.621597. PMID: 33584590; PMCID: PMC7874003.
- Mavrides DE, Morgan AL, Na JG, Graham PA, McHugh TD. Antimicrobial resistance profiles of bacteria associated with lower respiratory tract infections in cats and dogs in England. *Vet Rec*. 2022 Feb;190(4):e779. doi: 10.1002/vetr.779. Epub 2021 Aug 11. PMID: 34379795.
- Messer JS, Kegge SJ, Cooper ES, Colitz CM, Abramson CJ (2006): Meningoencephalomyelitis caused by *Pasteurella multocida* in a cat. *J Vet Int Med* 20, 1033-1036.
- Moon DC, Choi JH, Bobby N, Kim SJ, Song HJ, Park HS, Gil MC, Yoon SS, Lim SK. Prevalence of Bacterial Species in Skin, Urine, Diarrheal Stool, and Respiratory Samples in Cats. *Pathogens*. 2022 Mar 7;11(3):324. doi: 10.3390/pathogens11030324. PMID: 35335648; PMCID: PMC8950848.
- Moyaert H, de Jong A, Simjee S, Rose M, Youala M, El Garch F, Vila T, Klein U, Rzewuska M, Morrissey I (2019): Survey of antimicrobial susceptibility of bacterial pathogens isolated from dogs and cats with respiratory tract infections in Europe: ComPath results. *J Appl Microbiol* 127(1), 29-46. doi:10.1111/jam.14274. Epub 2019 May 16. PubMed PMID: 30955231.
- Ottenjann M, Lübke-Becker A, Linzmann H, Brunnberg L, Kohn B (2008): Pyothorax in 26 cats: clinical signs, laboratory results and therapy (2000-2007). *Berl Munch Tierarztl Wochenschr* 121, 365-373.
- Perez García J, Candel González FJ, Baos Muñoz E, González Romo F, Picazo JJ (2009): Cellulitis after a cat bite. *Rev Esp Quimioter* 22, 221-223.
- Rondon-Berrios H, Trebejo-Nunez GJ (2010): Pets or pest: peritoneal dialysis-related peritonitis due to *Pasteurella multocida*. *J Microbiol Immunol Infect* 43:155-158.
- Roy J, Messier S, Labrecque O, Cox WR (2007): Clinical and in vitro efficacy of amoxicillin against bacteria associated with feline skin wounds and abscesses. *Can Vet J* 48, 607-611.

Schmal-Filius E, Nedorost N, Weissenbacher-Lang C, Weissenböck H. A retrospective study on the presence of selected infectious agents in lung samples of cats with pneumonia. *Acta Vet Hung*. 2020 Sep 30;68(3):275-284. doi: 10.1556/004.2020.00037. PMID: 33221738.

Sim JJ, Lau SF, Omar S, Watanabe M, Aslam MW. A Retrospective Study on Bacteriology, Clinicopathologic and Radiographic Features in 28 Cats Diagnosed with Pyothorax. *Animals (Basel)*. 2021 Aug 3;11(8):2286. doi: 10.3390/ani11082286. PMID: 34438744; PMCID: PMC8406089.

Sol PM, van de Kar NC, Schreuder MF (2012): Cat induced *Pasteurella multocida* peritonitis in peritoneal dialysis: a case report and review of the literature. *Int J Hyg Environ Health*; epub ahead of print.

Walker AL, Jang SS, Hirsh DC (2000): Bacteria associated with pyothorax of dogs and cats: 98 cases (1989-1998). *J Am Vet Med Assoc* 216, 359-363.

Westling K, Bygdeman S, Enkvist O, Jorup-Rönström C (2000): *Pasteurella multocida* infection following cat bites in humans. *J Infect* 40: 97-98.

Wilson BA, Ho M (2013): *Pasteurella multocida*: from zoonosis to cellular microbiology. *Clin Microbiol Rev* 26(3), 631-55. doi: 10.1128/CMR.00024-13. Review. PubMed PMID: 23824375; PubMed Central PMCID: PMC3719492.