Nebraska Department of Health and Human Services

Health Alert Network

UPDATE

November 13, 2025

Updated Best Practices for Treatment and Prophylaxis of Human Tularemia

Summary

- CDC recently published updates for treatment and prophylaxis of human tularemia in an MMWR report.
- Notable updates include:
    - Use of a treatment and prophylaxis framework.
    - Fluoroquinolones (ciprofloxacin or levofloxacin) and doxycycline are designated as first-line treatment options for outbreaks of any size.
    - Identification of third-tier treatment options when first-line and alternative antimicrobials are unavailable or contraindicated for certain patients.
    - Recommendations for neonates, breastfeeding infants, lactating mothers, patients with compromised immune systems, and geriatric patients.

Treatment Recommendations for Adults and Children

In persons with tularemia, CDC recommends first-line antimicrobial therapy with ciprofloxacin, levofloxacin, gentamicin, or doxycycline for adults and children aged ≥1 month and ciprofloxacin or gentamicin for neonates (aged ≤28 days).

- The choice between antimicrobials depends on severity of disease, availability of the drug, and shared decision-making, including discussion of the route of administration and side-effect profile.
- If intentional release of *Francisella tularensis* is suspected, dual antimicrobial therapy is recommended for initial treatment.
- When treatment initiation is delayed, use of ciprofloxacin, levofloxacin, or gentamicin is preferred over doxycycline.
- Treatment duration is 10 days for ciprofloxacin, levofloxacin, or gentamicin and 14 – 21 days for doxycycline.

Treatment Recommendations for Pregnant Women

In pregnant women with tularemia, CDC recommends first-line antimicrobial management with ciprofloxacin, levofloxacin, or gentamicin.

- The choice between antimicrobials depends on severity of disease, availability of the drug, and shared decision-making, including discussion of the route of administration and side-effect profile.
- If intentional release of *F. tularensis* is suspected, dual antimicrobial therapy is recommended for initial treatment.
- The treatment duration for ciprofloxacin, levofloxacin, and gentamicin is the same as for the nonpregnant adult population.

Postexposure Prophylaxis Recommendation for Adults (Including Pregnant Women) and Children

For postexposure prophylaxis (PEP) for adults and children potentially exposed to *F. tularensis*, CDC recommends using ciprofloxacin, levofloxacin, or doxycycline for nonpregnant adults, children, and neonates. For pregnant women, ciprofloxacin or levofloxacin is recommended.

- PEP should not be delayed if the preferred antimicrobial is not immediately available. Providers should begin prophylaxis with an available alternative antimicrobial until the preferred antimicrobial becomes available.
- PEP duration is 7 days for ciprofloxacin and levofloxacin and 10 – 14 days for doxycycline.

Additional Information

CDC MMWR Report: Tularemia Antimicrobial Treatment and Prophylaxis

CDC Clinical Testing and Diagnosis

CDC Clinical Signs and Symptoms

Nebraska DHHS Tick Surveillance Map

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TABLE 1. Treatment of adults and children with tularemia — CDC recommendations for naturally acquired infections and bioterrorism response, United States, 2025

Population	Category	Antimicrobial class	Antimicrobial	Dosage	Duration (days)
Adults aged ≥18 yrs	First-line	Fluoroquinolone	Ciprofloxacin*	400 mg every 8 hrs IV or 750 mg every 12 hrs orally	10
			Levofloxacin*	750 mg every 24 hrs IV or orally	10
		Aminoglycoside	Gentamicin*	6 mg/kg every 24 hrs IV or IM†	10
		Tetracycline	Doxycycline	200 mg loading dose, then 100 mg every 12 hrs IV or orally	14–21
	Alternative	Fluoroquinolone	Moxifloxacin*,§	400 mg every 24 hrs IV or orally	10
			Ofloxacin*,¶	400 mg every 12 hrs orally	10
		Aminoglycoside	Amikacin*	15 mg/kg every 24 hrs IV or IM†	10
			Plazomicin*	15 mg/kg every 24 hrs IV†	10
			Tobramycin*	6 mg/kg every 24 hrs IV or IM†	10
		Tetracycline	Tetracycline	500 mg every 6 hrs orally	14–21
Children and adolescents aged ≥1 mo to ≤17 yrs (unless otherwise noted)	First-line	Fluoroquinolone	Ciprofloxacin*	10 mg/kg every 8–12 hrs IV (maximum 400 mg/dose) or 15 mg/kg every 8–12 hrs orally (maximum 500 mg/dose every 8 hrs or 750 mg/dose every 12 hrs)	10
			Levofloxacin*	Infants and children aged <5 yrs: 10 mg/kg every 12 hours IV or orally (maximum 375 mg/dose) Children and adolescents aged ≥5 yrs: 10 mg/kg every 24 hours IV or orally (maximum 750 mg/dose)	10
		Aminoglycoside	Gentamicin*	5–7.5 mg/kg every 24 hrs IV or IM† (mg/kg dose determined by age**; upper range can be increased to 9.5 mg/kg based on age and AUC monitoring)	10
		Tetracycline	Doxycycline	4.4 mg/kg loading dose (maximum 200 mg), then 2.2 mg/kg every 12 hrs IV or orally (maximum 100 mg/dose)	14–21
	Alternative	Fluoroquinolone	Moxifloxacin*,§	Infants and children aged ≥3 mos to ≤23 mos: 6 mg/kg every 12 hrs IV or orally Children aged 2–5 yrs: 5 mg/kg every 12 hrs IV or orally Children aged 6–11 yrs: 4 mg/kg every 12 hrs IV or orally Children and adolescents aged 12 to ≤17 yrs: Body weight <45 kg: 4 mg/kg every 12 hrs IV or orally (maximum dose for all children weighing <45 kg: 200 mg/dose) Body weight ≥45 kg: 400 mg every 24 hrs IV or orally	10
			Ofloxacin*,¶	7.5 mg/kg every 12 hrs orally (maximum 400 mg/dose)	10
		Aminoglycoside	Amikacin*	15–20 mg/kg every 24 hrs IV or IM†	10
			Tobramycin*	5–7 mg/kg every 24 hrs IV or IM†	10
		Tetracycline	Tetracycline††	10 mg/kg every 6 hrs orally (maximum 500 mg/dose)	14–21

- Patients who are treated initially with an IV or IM antimicrobial can be transitioned to an oral regimen once they have defervesced and clinically improved.
- Switching antimicrobial class is permissible, if needed.
- Antimicrobials are listed alphabetically within each class.
- For patients with severe infection, health care providers should consider treating initially with an aminoglycoside, if possible. Combination therapy with two classes of effective antimicrobials can also be used for severe tularemia (e.g., gentamicin plus ciprofloxacin or gentamicin plus doxycycline), although there is minimal evidence that initial treatment with two distinct classes of antimicrobials improves outcomes. Doxycycline monotherapy should not be used for patients with severe infection or substantial delays in treatment (>2 weeks).
- Treatment recommendations for geriatric patients and those with immunocompromise do not differ from those for the general population. However, health care providers should recognize the potential for polypharmacy with resultant drug–drug interactions and adjust antimicrobials accordingly.

Abbreviations: AUC = area under the curve (i.e., drug exposure over 24 hours); FDA = Food and Drug Administration; IM = intramuscular; IV = intravenous.

* Not approved by the FDA for treatment of tularemia. Ciprofloxacin, levofloxacin, and gentamicin have been used frequently off-label for the treatment of naturally occurring tularemia in humans. Large-scale distribution and use of these antimicrobials after a mass exposure event would be at the discretion of the FDA under an Emergency Use Authorization or other authority.

† Extended-interval dosing. Monitor drug levels and renal function; extend interval further (beyond 24 hours) if indicated.

§ Moxifloxacin suspension for oral liquid administration is not available in the United States; however, hospitals and compounding retail pharmacies can use a published recipe to make a liquid suspension. Moxifloxacin is not FDA-approved for use in children and adolescents aged ≤17 years but has been used off-label (**Source:** Dixit A, Karandikar MV, Jones S, Nakamura MM. Safety and tolerability of moxifloxacin in children. J Pediatric Infect Dis Soc 2018;7:e92–101). For children and adolescents aged 12–17 years weighing ≥45 kg with risk factors for cardiac events, consider 200 mg twice daily to reduce risk for QT prolongation.

¶ Ofloxacin suspension for oral liquid administration is not available in the United States; however, hospitals and compounding retail pharmacies can use a published recipe to make a liquid suspension. Ofloxacin is not FDA-approved for use in children and adolescents aged ≤17 years but has been used off-label (**Source:** Garcia-Prats AJ, Draper HR, Thee S, et al. Pharmacokinetics and safety of ofloxacin in children with drug-resistant tuberculosis. Antimicrob Agents Chemother 2015;59:6073–9).

** Adjust dose as needed based on drug levels and renal function. Consult local guidelines. Certain references suggest 7.5 mg/kg/day IV or IM every 24 hours for patients aged 1 month to ≤10 years and 6 mg/kg/day IV or IM every 24 hours for patients aged >10 years (**Sources:** Bialkowski S, Staatz CE, Clark J, Lawson R, Hennig S. Gentamicin pharmacokinetics and monitoring in pediatric patients with febrile neutropenia. Ther Drug Monit 2016;38:693–8 and Hartman SJF, Orriëns LB, Zwaag SM, Poel T, de Hoop M, de Wildt SN. External validation of model-based dosing guidelines for vancomycin, gentamicin, and tobramycin in critically ill neonates and children: a pragmatic two-center study. Paediatr Drugs 2020;22:433–44).

†† Because of the risk for permanent tooth discoloration and tooth enamel hypoplasia, tetracycline should only be used for children aged <8 years when other options are unavailable.

TABLE 2. Postexposure prophylaxis for adults and children potentially exposed to *Francisella tularensis* — CDC recommendations for occupational exposures and bioterrorism response, United States, 2025

Population	Category	Antimicrobial class	Antimicrobial	Dosage	Duration (days)
Adults aged ≥18 yrs	First-line	Fluoroquinolone	Ciprofloxacin	500 mg every 12 hrs orally	7
			Levofloxacin	500 mg every 24 hrs orally	7
		Tetracycline	Doxycycline	100 mg every 12 hrs orally	10–14
	Alternative	Fluoroquinolone	Moxifloxacin*	400 mg every 24 hrs orally	7
			Ofloxacin†	400 mg every 12 hrs orally	7
		Tetracycline	Minocycline	100 mg every 12 hrs orally	10–14
			Tetracycline	500 mg every 6 hrs orally	10–14
		Macrolide	Azithromycin (for Type A and susceptible Type B biovars§)	500 mg every 24 hrs orally	10
Children and adolescents aged ≥1 mo to ≤17 yrs (unless otherwise noted)	First-line	Fluoroquinolone	Ciprofloxacin	15 mg/kg every 12 hrs orally (maximum 500 mg/dose)	7
			Levofloxacin	Infants and children aged <5 yrs: 8 mg/kg every 12 hours orally (maximum 250 mg/dose) Children aged ≥5 yrs and adolescents: 8 mg/kg every 24 hours orally (maximum 500 mg/dose)	7
		Tetracycline	Doxycycline	2.2 mg/kg every 12 hrs orally (maximum 100 mg/dose)	10–14
	Alternative	Fluoroquinolone	Moxifloxacin*	Infants and children aged ≥3 mos to ≤23 mos: 6 mg/kg every 12 hrs orally Children aged 2–5 yrs: 5 mg/kg every 12 hrs orally Children aged 6–11 yrs: 4 mg/kg every 12 hrs orally Children and adolescents aged 12 to ≤17 yrs: Body weight <45 kg: 4 mg/kg every 12 hrs orally (maximum dose for all children weighing <45 kg: 200 mg/dose) Body weight ≥45 kg: 400 mg every 24 hrs orally	7
			Ofloxacin†	7.5 mg/kg every 12 hrs orally (maximum 400 mg/dose)	7
		Tetracycline	Minocycline¶	2 mg/kg every 12 hrs orally (maximum 100 mg/dose)	10–14
			Tetracycline¶	10 mg/kg every 6 hrs orally (maximum 500 mg/dose)	10–14
		Macrolide	Azithromycin (for Type A and susceptible Type B biovars§)	Body weight <45 kg: 10 mg/kg every 24 hrs orally Body weight ≥45 kg: 500 mg every 24 hrs orally	10

- Antimicrobials are listed alphabetically within each class.
- Prophylaxis recommendations for geriatric patients and those with immunocompromise do not differ from those for the general population. However, health care providers should recognize the potential for polypharmacy with resultant drug–drug interactions and adjust antimicrobials accordingly.
- Note: The antibiotics listed in this table are not approved by the FDA for prophylaxis of tularemia. Ciprofloxacin has been used frequently off-label for prophylaxis of naturally occurring tularemia in humans. Large-scale distribution and use of these antimicrobials after a mass exposure event would be at the discretion of the FDA under an Emergency Use Authorization or other authority.

Abbreviations: FDA = Food and Drug Administration; PEP = postexposure prophylaxis.

* Moxifloxacin suspension for oral liquid administration is not available in the United States; however, hospitals and compounding retail pharmacies can use a published recipe to make a liquid suspension. Moxifloxacin is not FDA-approved for use in children and adolescents aged ≤17 years but has been used off-label (**Source:** Dixit A, Karandikar MV, Jones S, Nakamura MM. Safety and tolerability of moxifloxacin in children. J Pediatric Infect Dis Soc 2018;7:e92–101). For children and adolescents aged 12–17 years weighing ≥45 kg with risk factors for cardiac events, consider 200 mg twice daily to reduce risk for QT prolongation.

† Ofloxacin suspension for oral liquid administration is not available in the United States; however, hospitals and compounding retail pharmacies can use a published recipe to make a liquid suspension. Ofloxacin is not FDA-approved for use in children and adolescents aged ≤17 years but has been used off-label (**Source:** Garcia-Prats AJ, Draper HR, Thee S, et al. Pharmacokinetics and safety of ofloxacin in children with drug-resistant tuberculosis. Antimicrob Agents Chemother 2015;59:6073–9).

§ *Francisella tularensis* subspecies *tularensis* (Type A) is limited to North America and susceptible to macrolides. *F. tularensis* subspecies *holarctica* (Type B) biovar I strains (in North America and Western Europe) and biovar *japonica* strains (primarily found in Japan) are also susceptible to macrolides. *F. tularensis* subspecies *holarctica* biovar II strains found in Eastern Europe and Asia are inherently resistant to macrolides. Thus, azithromycin can be used if PEP is indicated after natural occupational exposures in the United States (e.g., contact with an infected animal). In the wake of an intentional release, azithromycin can be used for PEP initially if needed. If additional information identifies a resistant strain, patients should be switched to another antimicrobial.

¶ Because of the risk for permanent tooth discoloration and tooth enamel hypoplasia, tetracycline and minocycline should only be used for children aged <8 years when other options are unavailable.

TABLE 3. Treatment of pregnant women with tularemia — CDC recommendations for naturally acquired infections and bioterrorism response, United States, 2025

Category	Antimicrobial class	Antimicrobial	Dosage	Duration (days)
First-line	Fluoroquinolone	Ciprofloxacin*	400 mg every 8 hrs IV or 750 mg every 12 hrs orally†	10
		Levofloxacin*	750 mg every 24 hrs IV or orally	10
	Aminoglycoside	Gentamicin*	6 mg/kg every 24 hrs IV or IM§	10
Alternative	Fluoroquinolone	Moxifloxacin*,¶	400 mg every 24 hrs IV or orally	10
		Ofloxacin*,¶	400 mg every 12 hrs IV or orally	10
	Aminoglycoside	Amikacin*	15 mg/kg every 24 hrs IV or IM§	10
		Tobramycin*	6 mg/kg every 24 hrs IV or IM§	10
	Tetracycline	Doxycycline	200 mg loading dose, then 100 mg every 12 hrs IV or orally	14–21

- Patients who are treated initially with an IV or IM antimicrobial can be transitioned to an oral regimen once they have defervesced and clinically improved.
- Switching antimicrobial class is permissible, if needed.
- Antimicrobials are listed alphabetically within each class.
- For pregnant patients with severe infection, health care providers should consider treating initially with an aminoglycoside if possible. Combination therapy with two classes of effective antimicrobials can also be used for severe tularemia (e.g., gentamicin plus ciprofloxacin), although there is minimal evidence that initial treatment with two distinct classes of antimicrobials improves outcomes. Doxycycline monotherapy should not be used for patients with severe infection or substantial delays in treatment (>2 weeks).

Abbreviations: FDA = Food and Drug Administration; IM = intramuscular; IV = intravenous.

* Not approved by the FDA for treatment of tularemia. Ciprofloxacin, levofloxacin, and gentamicin have been used frequently off-label for the treatment of naturally occurring tularemia in humans. Large-scale distribution and use of these antimicrobials after a mass exposure event would be at the discretion of the FDA under an Emergency Use Authorization or other authority.

† For patients in the third trimester of pregnancy, consider 500 mg every 8 hours.

§ Extended-interval dosing. Monitor drug levels and extend interval further (beyond 24 hours) if indicated. However, for pregnant patients, certain experts recommend conventional dosing of aminoglycosides rather than extended-interval dosing. Consult local guidelines.

¶ Moxifloxacin and ofloxacin suspensions for oral liquid administration are not available in the United States; however, hospitals and compounding retail pharmacies can use a published recipe to make a liquid suspension.

TABLE 4. Postexposure prophylaxis for pregnant women potentially exposed to *Francisella tularensis* — CDC recommendations for occupational exposures and bioterrorism response, United States, 2025

Category	Antimicrobial class	Antimicrobial	Dosage	Duration (days)
First-line	Fluoroquinolone	Ciprofloxacin	500 mg every 12 hrs orally	7
		Levofloxacin	500 mg every 24 hrs orally	7
Alternative	Tetracycline	Doxycycline	100 mg every 12 hrs orally	10–14
	Fluoroquinolone	Moxifloxacin*	400 mg every 24 hrs orally	7
		Ofloxacin*	400 mg every 12 hrs orally	7
	Macrolide	Azithromycin (for Type A and susceptible Type B biovars†)	500 mg every 24 hrs orally	10

- Antimicrobials are listed alphabetically within the fluoroquinolone class.
- Note: The antibiotics listed in this table are not approved by the FDA for prophylaxis of tularemia. Ciprofloxacin has been used frequently off-label for prophylaxis of naturally occurring tularemia in humans. Large-scale distribution and use of these antimicrobials after a mass exposure event would be at the discretion of the FDA under an Emergency Use Authorization or other authority.

Abbreviations: FDA = Food and Drug Administration; PEP = postexposure prophylaxis.

* Moxifloxacin and ofloxacin suspensions for oral liquid administration are not available in the United States; however, hospitals and compounding retail pharmacies can use a published recipe to make a liquid suspension.

† *Francisella tularensis* subspecies *tularensis* (Type A) is limited to North America and susceptible to macrolides. *F. tularensis* subspecies *holarctica* (Type B) biovar I strains (in North America and Western Europe) and biovar *japonica* strains (primarily found in Japan) are also susceptible to macrolides. *F. tularensis* subspecies *holarctica* biovar II strains found in Eastern Europe and Asia are inherently resistant to macrolides. Thus, azithromycin can be used if PEP is indicated after natural occupational exposures in the United States (e.g., contact with an infected animal). In the wake of an intentional release, azithromycin can be used for PEP initially if needed. If additional information identifies a resistant strain, patients should be switched to another antimicrobial.

TABLE 5. Treatment of neonates aged ≤28 days with tularemia — CDC recommendations for naturally acquired infections and bioterrorism response, United States, 2025

Category	Antimicrobial class	Antimicrobial	Dosage	Duration (days)
First-line	Fluoroquinolone	Ciprofloxacin*	10 mg/kg every 8 or 12 hrs IV	10
	Aminoglycoside	Gentamicin*	30–34 weeks' gestational age: Postnatal age ≤10 days: 5 mg/kg every 36 hrs IV or IM† Postnatal age >10 days: 5 mg/kg every 24 hrs IV or IM† ≥35 weeks' gestational age: 5 mg/kg every 24 hrs IV or IM†	10
Alternative	Fluoroquinolone	Levofloxacin*	10 mg/kg every 12 hrs IV	10
	Aminoglycoside	Amikacin*	30–34 weeks' gestational age: Postnatal age ≤10 days: 15 mg/kg every 36 hrs IV or IM† Postnatal age >10 days: 15 mg/kg every 24 hrs IV or IM† ≥35 weeks' gestational age: Postnatal age ≤7 days: 15 mg/kg every 24 hrs IV or IM† Postnatal age >7 days: 18 mg/kg every 24 hrs IV or IM†	10
		Tobramycin*	30–34 weeks' gestational age: Postnatal age ≤10 days: 5 mg/kg every 36 hrs IV or IM† Postnatal age >10 days: 5 mg/kg every 24 hrs IV or IM† ≥35 weeks' gestational age: 5 mg/kg every 24 hrs IV or IM†	10
	Tetracycline	Doxycycline	4.4 mg/kg loading dose, then 2.2 mg/kg every 12 hrs IV	14–21

- Neonates who are treated initially with an IV or IM antimicrobial can be transitioned to an oral regimen once they have defervesced and clinically improved.
- Switching antimicrobial class is permissible, if needed.
- Antimicrobials are listed alphabetically within the aminoglycoside class.
- For neonates with severe infection, health care providers should consider treating initially with an aminoglycoside if possible. Combination therapy with two classes of effective antimicrobials can also be used for severe tularemia (e.g., gentamicin plus ciprofloxacin or gentamicin plus doxycycline), although there is minimal evidence that initial treatment with two distinct classes of antimicrobials improves outcomes. Doxycycline monotherapy should not be used for neonates with severe infection or substantial delays in treatment (>2 weeks).

Abbreviations: FDA = Food and Drug Administration; IM = intramuscular; IV = intravenous.

* Not approved by the FDA for treatment of tularemia. Ciprofloxacin, levofloxacin, and gentamicin have been used frequently off-label for the treatment of naturally occurring tularemia in humans. Large-scale distribution and use of these antimicrobials after a mass exposure event would be at the discretion of the FDA under an Emergency Use Authorization or other authority.

† Extended-interval dosing. Monitor drug levels and renal function; adjust dose and interval if necessary. Aminoglycoside dosing information for neonates <30 weeks' gestational age can be found in the 2024–2027 Red Book (**Source:** American Academy of Pediatrics. Red Book: 2024–2027 report of the Committee on Infectious Diseases, 33rd edn. Kimberlin DW, Banerjee R, Barnett ED, Lynfield F, Sawyer MH, eds. Itasca, IL: American Academy of Pediatrics; 2024).

TABLE 6. Postexposure prophylaxis of neonates aged ≤28 days potentially exposed to *Francisella tularensis* — CDC recommendations for bioterrorism response, United States, 2025

Category	Antimicrobial class	Antimicrobial	Dosage	Duration (days)
First-line	Fluoroquinolone	Ciprofloxacin	12.5 mg/kg every 12 hrs orally	7
		Levofloxacin	10 mg/kg every 12 hrs orally	7
	Tetracycline	Doxycycline	2.2 mg/kg every 12 hrs orally	10–14
Alternative	Fluoroquinolone	Ofloxacin*	7.5 mg/kg every 12 hrs orally	7

- Antimicrobials are listed alphabetically within the fluoroquinolone class.
- Note: The antibiotics listed in this table are not approved by the FDA for prophylaxis of tularemia. Ciprofloxacin has been used frequently off-label for prophylaxis of naturally occurring tularemia in humans. Large-scale distribution and use of these antimicrobials after a mass exposure event would be at the discretion of the FDA under an Emergency Use Authorization or other authority.

Abbreviation: FDA = Food and Drug Administration.

* Ofloxacin suspension for oral liquid administration is not available in the United States; however, hospitals and compounding retail pharmacies can use a published recipe to make a liquid suspension. Ofloxacin is not FDA-approved for use in children and adolescents aged ≤17 years but has been used off-label (**Source:** Garcia-Prats AJ, Draper HR, Thee S, et al. Pharmacokinetics and safety of ofloxacin in children with drug-resistant tuberculosis. Antimicrob Agents Chemother 2015;59:6073–9).