Summary

These recommendations update information regarding the polysaccharide vaccine licensed in the United States for use against disease caused by Neisseria meningitidis serogroups A, C, Y, and W-135, as well as antimicrobial agents for chemoprophylaxis against meningococcal disease (superseding MMWR 1985;34:255-9). This report provides additional information regarding meningococcal vaccines and the addition of ciprofloxacin and ceftriaxone as acceptable alternatives to rifampin for chemoprophylaxis in selected populations.

INTRODUCTION

Neisseria meningitidis causes both endemic and epidemic disease, principally meningitis and meningococcemia (1). As a result of the control of Haemophilus influenzae type b infections, N. meningitidis has become the leading cause of bacterial meningitis in children and young adults in the United States, with an estimated 2,600 cases each year (2). The case-fatality rate is 13% for meningitic disease (defined as the isolation of N. meningitidis from cerebrospinal fluid) and 11.5% for persons who have N. meningitidis isolated from blood (2), despite therapy with antimicrobial agents (e.g., penicillin) to which U.S. strains remain clinically sensitive (3).

The incidence of meningococcal disease peaks in late winter to early spring. Attack rates are highest among children 3-12 months of age and then steadily decline among older age groups (Figure_1). Based on multistate surveillance conducted during

1989-1991, serogroup B organisms accounted for 46% of all cases

and serogroup C for 45%; serogroups W-135 and Y and strains that

could not be serotyped accounted for most of the remaining cases

(2). Recent data indicate that the proportion of cases caused by

serogroup Y strains is increasing (4). Serogroup A, which rarely

causes disease in the United States, is the most common cause of

epidemics in Africa and Asia. In the United States, localized

community outbreaks of serogroup C disease and a statewide

serogroup B epidemic have recently been reported (5,6).   Persons who have certain

medical conditions are at increased

risk for developing meningococcal infection. Meningococcal disease

is particularly common among persons who have component

deficiencies in the terminal common complement pathway (C3, C5-C9);

many of these persons experience multiple episodes of

infection (6). Asplenic persons also may be at increased risk for

acquiring meningococcal disease with particularly severe

infections (8). Persons who have other diseases associated with

immunosuppression (e.g., human immunodeficiency virus {HIV} and

Streptococcus pneumoniae) may be at higher risk for acquiring

meningococcal disease and for disease caused by some other

encapsulated bacteria. Evidence suggests that HIV-infected persons

are not at substantially increased risk for epidemic serogroup A

meningococcal disease (9); however, such patients may be at

increased risk for sporadic meningococcal disease or disease

caused by other meningococcal serogroups (10). Previously,

military recruits had high rates of meningococcal disease,

particularly serogroup C disease; however, since the initiation of routine vaccination of recruits with the bivalent A/C meningococcal vaccine in 1971, the high rates of meningococcal disease caused by those serogroups have decreased substantially and cases occur infrequently (11). Military recruits now routinely receive the quadrivalent A,C,Y, W-135 meningococcal vaccine.

MENINGOCOCCAL POLYSACCHARIDE VACCINE

The quadrivalent A,C,Y,W-135 vaccine (Menomune -A,C,Y,W-135, manufactured by Connaught Laboratories, Inc.) is the formulation currently available in the United States. The recommended dose of vaccine is a single 0.5-mL subcutaneous injection. Each vaccine dose consists of 50 ug each of the purified bacterial capsular polysaccharides. Menomune is available in single-dose, 10-dose, and 50-dose vials.

Vaccine Efficacy

The immunogenicity and clinical efficacy of the serogroups A and C meningococcal vaccines have been well established. The serogroup A polysaccharide induces antibody in some children as young as 3 months of age, although a response comparable with that among adults is not achieved until 4 or 5 years of age; the serogroup C component is poorly immunogenic in recipients who are less than 18-24 months of age (12,13). The serogroups A and C vaccines have demonstrated estimated clinical efficacies of 85%-100% in older children and adults and are useful in controlling epidemics (9,14-17). Serogroups Y and W-135 polysaccharides are safe and immunogenic in adults and in children greater than 2 years of age (18-21); although clinical protection has not been

documented, vaccination with these polysaccharides induces bactericidal antibody. The antibody responses to each of the four polysaccharides in the quadrivalent vaccine are serogroup-specific and independent.   Duration of Efficacy   Measurable levels of antibodies against the group A and C polysaccharides decrease markedly during the first 3 years following a single dose of vaccine (13,22-25). This decrease in antibody occurs more rapidly in infants and young children than in adults. Similarly, although vaccine-induced clinical protection probably persists in schoolchildren and adults for at least 3 years, the efficacy of the group A vaccine in young children may decrease markedly with the passage of time: in a 3-year study, efficacy declined from greater than 90% to less than 10% among children who were less than 4 years of age at the time of vaccination, whereas among children who were greater than or equal to 4 years of age when vaccinated, efficacy was 67% 3 years later (26).   RECOMMENDATIONS FOR USE OF MENINGOCOCCAL VACCINE   Routine vaccination of civilians with the quadrivalent meningococcal polysaccharide vaccine is not recommended because of its relative ineffectiveness in children less than 2 years of age (among whom risk for endemic disease is highest) and its relatively short duration of protection. However, the polysaccharide meningococcal vaccine is useful for controlling serogroup C meningococcal outbreaks (27).   Indications for Use   In general, use of polysaccharide meningococcal vaccine should be restricted to persons greater than or equal to 2 years of age; however, children as young as 3 months of age may be

vaccinated to elicit short-term protection against serogroup A

meningococcal disease (two doses administered 3 months apart

should be considered for children 3-18 months of age) (28). Routine vaccination with the quadrivalent vaccine is

recommended for certain high-risk groups, including persons who

have terminal complement component deficiencies and those who have

anatomic or functional asplenia. Persons whose spleens have been

removed because of trauma or nonlymphoid tumors and persons who

have inherited complement deficiencies have acceptable antibody

responses to meningococcal vaccine; however, the clinical efficacy

of vaccination has not been documented for these persons, and they

may not be protected by vaccination (7,29). Research, industrial,

and clinical laboratory personnel who routinely are exposed to N.

meningitidis in solutions that may be aerosolized should be

considered for vaccination. Vaccination with the quadrivalent vaccine may benefit

travelers to and U.S. citizens residing in countries in which N.

meningitidis is hyperendemic or epidemic, particularly if contact

with the local populace will be prolonged. Single-dose vials of

the quadrivalent vaccine are now available and may be more

convenient than multidose vials for use in international health

clinics for travelers (30). Epidemics of meningococcal disease are

recurrent in that part of sub-Saharan Africa known as the

"meningitis belt," which extends from Senegal in the west to

Ethiopia in the east (Figure_2) (31). Epidemics in the

 meningitis

belt usually occur during the dry season (i.e., from December to

June); thus, vaccination is recommended for travelers visiting

this region during that time. Epidemics occasionally are identified in other parts of the world and recently have occurred in Saudi Arabia (during a Haj pilgrimage), Kenya, Tanzania, Burundi, and Mongolia. Information concerning geographic areas for which vaccination is recommended can be obtained from international health clinics for travelers, state health departments, and CDC (telephone: {404} 332-4559). Primary Vaccination For both adults and children, vaccine is administered subcutaneously as a single 0.5-mL dose. The vaccine can be administered at the same time as other vaccines but at a different anatomic site (i.e., deltoid muscle or buttocks). Protective levels of antibody are usually achieved within 7-10 days after vaccination. Revaccination Revaccination may be indicated for persons at high risk for infection (e.g., persons remaining in areas in which disease is epidemic), particularly for children who were first vaccinated when they were less than 4 years of age; such children should be considered for revaccination after 2-3 years if they remain at high risk. Although the need for revaccination of older children and adults has not been determined, antibody levels decline rapidly over 2-3 years, and if indications still exist for immunization, revaccination may be considered within 3-5 years. PRECAUTIONS AND CONTRAINDICATIONS

Reactions to Vaccination Adverse reactions to meningococcal vaccine are mild and consist principally of pain and redness at the injection site, for 1-2 days. Estimates of incidence of mild-to-moderate local reactions have varied, ranging from infrequent to greater than 40% among vaccine recipients (32,33). Pain at the site of injection is

the most commonly reported adverse reaction, and a transient fever

might develop in less than or equal to 2% of young children. Vaccination During

Pregnancy Studies of vaccination during pregnancy have not documented

adverse effects among either pregnant women or newborns (34,35).

In addition, these studies have documented high antibody levels in

maternal and umbilical cord blood following vaccination during

pregnancy. Antibody levels in the infants decreased during the

first few months after birth; subsequent response to meningococcal

vaccination was not affected (35). These observations have been

confirmed in more recent studies of other polysaccharide vaccines

administered during pregnancy (36). Based on data from studies

involving use of meningococcal vaccines and other polysaccharide

vaccines administered during pregnancy, altering meningococcal

vaccination recommendations during pregnancy is unnecessary. PROSPECTS FOR NEW

MENINGOCOCCAL VACCINES To enhance the immunogenicity and protective efficacy of

A

and C polysaccharides in infants and young children, methods

similar to those used for H. influenzae type b conjugate vaccines

have been applied to produce conjugate serogroups A and C vaccines

(37,38). Capsular polysaccharides are being covalently linked to

carrier proteins to convert the T-cell-independent polysaccharide

to a T-cell-dependent antigen. The efficacy of these vaccines has

not been evaluated. Because the serogroup B capsular polysaccharide is poorly

immunogenic in humans, vaccine development for serogroup B

meningococci has focused on the outer membrane proteins as

potential immunogens. The immunogenicity and protective efficacy

of several outer membrane protein vaccines against several

serogroup B meningococci have been evaluated recently. Evaluation

of those vaccines documented estimated efficacies ranging from 57%

to 83% in older children and adults (39-41). However, a subsequent

study of one of these vaccines did not document efficacy in

children less than 4 years of age, the group often at highest risk

for disease (42). None of the currently available serogroup B

meningococcal vaccines are licensed for use in the United States. ANTIMICROBIAL

CHEMOPROPHYLAXIS Antimicrobial chemoprophylaxis of close contacts of sporadic

cases of meningococcal disease is the primary means for prevention

of meningococcal disease in the United States (Table_1). Close

contacts include a) household members, b) day care center

contacts, and c) anyone directly exposed to the patient's oral

secretions (e.g., through kissing, mouth-to-mouth resuscitation,

endotracheal intubation, or endotracheal tube management). The

attack rate for household contacts exposed to patients who have

sporadic meningococcal disease has been estimated to be four cases

per 1,000 persons exposed, which is 500-800 times greater than for

the total population (43). Because the rate of secondary disease

for close contacts is highest during the first few days after

onset of disease in the primary patient, antimicrobial

chemoprophylaxis should be administered as soon as possible

(ideally within 24 hours after the case is identified).

Conversely, chemoprophylaxis administered greater than 14 days

after onset of illness in the index case-patient is probably of

limited or no value. Oropharyngeal or nasopharyngeal cultures are

not helpful in determining the need for chemoprophylaxis and may

unnecessarily delay institution of this preventive measure. Rifampin is administered

twice daily for 2 days (600 mg every

12 hours for adults, 10 mg/kg of body weight every 12 hours for

children greater than or equal to 1 month of age, and 5 mg/kg

every 12 hours for infants less than 1 month of age). Rifampin is

effective in eradicating nasopharyngeal carriage of N.

meningitidis (44). Rifampin is not recommended for pregnant women,

because the drug is teratogenic in laboratory animals. Rifampin

changes the color of urine to reddish-orange and is excreted in

tears and other body fluids; it may cause permanent discoloration

of soft contact lenses. Because the reliability of oral

contraceptives may be affected by rifampin therapy, consideration

should be given to using alternate contraceptive measures while

rifampin is being administered. In addition to rifampin, other antimicrobial agents are

effective in reducing nasopharyngeal carriage of N. meningitidis.

Ciprofloxacin in various dosage regimens is greater than 90%

effective in eradicating nasopharyngeal carriage (45,46). A single

500-mg oral dose of ciprofloxacin is a reasonable alternative to

the multidose rifampin regimen. Ciprofloxacin levels in nasal

secretions far exceed the MIC90 for N. meningitidis following oral

dosing (47). Ciprofloxacin is not generally recommended for

persons less than 18 years of age or for pregnant and lactating

women because the drug causes cartilage damage in immature

laboratory animals. However, a recent international consensus

report has concluded that ciprofloxacin can be used for

chemoprophylaxis of children when no acceptable alternative

therapy is available (48).   When ceftriaxone was administered in a single parenteral

dose

(an intramuscular dose of 125 mg for children and 250 mg for adults), it was 97%-100% effective in eradicating pharyngeal carriage of N. meningitidis (49,50). Thus, ceftriaxone (diluted in 1% lidocaine to reduce local pain after injection) is also a reasonable alternative for chemoprophylaxis. Systemic antimicrobial therapy of meningococcal disease with agents other than ceftriaxone or other third-generation cephalosporins may not reliably eradicate nasopharyngeal carriage of N. meningitidis. If other agents have been used for treatment, the index patient should receive chemoprophylactic antibiotics for eradication of nasopharyngeal carriage before being discharged from the hospital (51). CONCLUSIONS N. meningitidis is the leading cause of bacterial meningitis in older children and young adults in the United States. The quadrivalent A, C, Y, and W-135 meningococcal vaccine available in the United States is recommended for control of serogroup C meningococcal disease outbreaks and for use among certain high-risk groups, including a) persons who have terminal complement deficiencies, b) persons who have anatomic or functional asplenia, and c) laboratory personnel who routinely are exposed to N. meningitidis in solutions that may be aerosolized. Vaccination also may benefit travelers to countries in which disease is hyperendemic or epidemic. Conjugate serogroup A and C meningococcal vaccines are being developed by using methods similar to those used for H. influenzae type b conjugate vaccines, and the efficacies of several experimental serogroup B meningococcal vaccines have been documented in older children and

young adults. Antimicrobial chemoprophylaxis of close contacts of patients

who have sporadic cases of meningococcal disease is the primary

means for prevention of meningococcal disease in the United

States. Rifampin has been the drug of choice for chemoprophylaxis;

however, data from recent studies document that single doses of

ciprofloxacin or ceftriaxone are reasonable alternatives to the

multidose rifampin regimen for chemoprophylaxis. References

CDC. Meningococcal vaccines. MMWR 1985;34:255-9.

CDC. Surveillance for diabetes mellitus -- United States,

1980-1989,

and laboratory-based surveillance for meningococcal disease

in selected areas -- United States, 1989-1991. MMWR 1993;42(No.

SS-2):21-30.

Jackson LA, Tenover FC, Baker C, et al. Prevalence of Neisseria

meningitidis relatively resistant to penicillin in the United

States, 1991. J Infect Dis 1994;169:438-41.

CDC. Serogroup Y meningococcal disease -- Illinois,

Connecticut,

and selected areas, United States, 1989-1996. 1996;45:1010-13.

Jackson LA, Schuchat A, Reeves MW, Wenger JD. Serogroup C

meningococcal outbreaks in the United States: an emerging

threat.

JAMA 1995;273:383-9.

CDC. Serogroup B meningococcal disease -- Oregon, 1994. MMWR

1995;44:121-4.

Figueroa JE, Densen P. Infectious diseases associated with complement deficiencies. Clin Microbiol Rev 1991;4:359-95.

Francke EL, Neu HC. Postsplenectomy infection. Surg Clin North Am 1981;61:135-55.

Pinner RW, Onyango F, Perkins BA, et al. Epidemic meningococcal disease in Nairobi, Kenya, 1989. J Infect Dis 1992;166:359-64.

Stephens DS, Hajjeh RA, Baughman WS, Harvey C, Wenger JD, Farley MM. Sporadic meningococcal disease in adults: results of a 5-year population-based study. Ann Int Med 1995;123:937-40.

Brundage JF, Zollinger WD. Evolution of meningococcal disease epidemiology in the U.S. Army. In: Vedros NA, ed. Evolution of meningococcal disease. 1st ed. vol I. Boca Raton, FL: CRC Press, 1987:5-25.

Peltola H, Kayhty H, Kuronen T, Haque N, Sarna S, Makela PH. Meningococcus group A vaccine in children three months to five years of age: adverse reactions and immunogenicity related to endotoxin content and molecular weight of the polysaccharide. J Pediatr 1978;92:818-22.

Gold R, Lepow ML, Goldschneider I, Draper TF, Gotschlich EC. Kinetics of antibody production to group A and group C meningococcal polysaccharide vaccines administered during the first six years of life: prospects for routine immunization of infants and children. J Infect Dis 1979;140:690-7.

Sippel JE. Meningococci. Crit Rev Microbiol 1981;8:267-302.

Taunay AE, Feldman RA, Bastos CO, Galvao PAA, Morais JS, Castro IO. Avalia§ o do efeito protetor de vacina polissacaridica antimeningocìcica do grupo C, em crian§as de 6 a 36 meses. Rev Inst Adolfo Lutz 1978;38:77-82.

Cochi SL, Markowitz LE, Joshi DD, et al. Control of epidemic group A meningococcal meningitis in Nepal. Int J Epidemiol 1987;16:91-7.

Rosenstein N, Levine O, Taylor J, et al. Persistent serogroup C meningococcal disease outbreak in a vaccinated population, Gregg County, Texas {Abstract G84}. In: 1996 Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC). American Society for Microbiology, 1996:185.

Griffiss JM, Brandt BL, Broud DD. Human immune response to various doses of group Y and W135 meningococcal polysaccharide vaccines. Infect Immun 1982;37:205-8.

Armand J, Arminjon F, Mynard MC, Lafaix C. Tetravalent meningococcal polysaccharide vaccine groups A, C, Y, W 135: clinical and serologic evaluation. J Biol Stand 1982;10:335-9.

Ambrosch F, Wiedermann G, Crooy P, George AM. Immunogenicity and side-effects of a new tetravalent meningococcal polysaccharide vaccine. Bull World Health Organ 1983;61:317-23.

Vodopija I, Baklaic Z, Hauser P, Roelants P, Andre FE, Safary

Reactivity and immunogenicity of bivalent (AC) and
tetravalent

(ACW135Y) meningococcal vaccines containing O-acetyl-negative
or

O-acetyl-positive group C polysaccharide. Infect Immun

1983;42:599-604.

Artenstein MS. Meningococcal infections. 5. Duration of

polysaccharide-vaccine-induced antibody. Bull World Health
Organ

1971;45:291-3.

Lepow ML, Goldschneider I, Gold R, Randolph M, Gotschlich EC.

Persistence of antibody following immunization of children with

groups A and C meningococcal polysaccharide vaccines.
Pediatrics

1977;60:673-80.

Kayhty H, Karanko V, Peltola H, Sarna S, Makela PH. Serum

antibodies to capsular polysaccharide vaccine of group A
Neisseria

meningitidis followed for three years in infants and children.
J

Infect Dis 1980;142:861-8.

Zangwill KM, Stout RW, Carlone GM, et al. Duration of antibody

response after meningococcal polysaccharide vaccination in US
Air

Force personnel. J Infect Dis 1994;169:847-52.

Reingold AL, Broome CV, Hightower AW, et al. Age-specific
differences in duration of clinical protection after vaccination
with meningococcal polysaccharide A vaccine. Lancet 1985;2:
114-8.

CDC. Control and prevention of meningococcal disease and
Control and prevention of serogroup C meningococcal disease:
evaluation and management of suspected outbreaks:
recommendations
of the Advisory Committee on Immunization Practices (ACIP).
MMWR
1997;46(No. RR-5).

Peltola H, Makela PH, Kayhty H, et al. Clinical efficacy of
meningococcus group A capsular polysaccharide vaccine in
children
three months to five years of age. N Engl J Med
1977;297:686-91.

Ruben FL, Hankins WA, Zeigler Z, et al. Antibody responses to
meningococcal polysaccharide vaccine in adults without a
spleen.
Am J Med 1984;76:115-21.

CDC. Meningococcal vaccine in single-dose vials for travelers
and high-risk persons. MMWR 1990;39:763.

Riedo FX, Plikaytis BD, Broome CV. Epidemiology and prevention
of meningococcal disease. Pediatr Infect Dis J 1995;14:643-57.

Lepow ML, Beeler J, Randolph M, Samuelson JS, Hankins WA.
Reactogenicity and immunogenicity of a quadrivalent combined

meningococcal polysaccharide vaccine in children. J Infect Dis
1986;154:1033-6.

Scheifele DW, Bjornson G, Boraston S. Local adverse effects of
meningococcal vaccine. Can Med Assoc J 1994;150:14-5.

de Andrade Carvalho A, Giampaglia CM, Kimura H, et al.
Maternal and infant antibody response to meningococcal
vaccination
in pregnancy. Lancet 1977;2:809-11.

McCormick JB, Gusm o HH, Nakamura S, et al. Antibody response
to serogroup A and C meningococcal polysaccharide vaccines in
infants born of mothers vaccinated during pregnancy. J Clin
Invest
1980;65:1141-4.

Englund JA, Glezen WP, Turner C, Harvey J, Thompson C, Siber
GR. Transplacental antibody transfer following maternal
immunization with polysaccharide and conjugate Haemophilus
influenzae type b vaccines. J Infect Dis 1995;171:99-105.

Anderson EL, Bowers T, Mink CM, et al. Safety and
immunogenicity of meningococcal A and C polysaccharide
conjugate
vaccine in adults. Infect Immun 1994;62:3391-5.

Twumasi PA, Kumah S, Leach A, et al. A trial of a group A plus
group C meningococcal polysaccharide-protein conjugate vaccine
in
African infants. J Infect Dis 1995;171:632-8.

Sierra GVG, Campa HC, Varcacel NM, et al. Vaccine against
group B Neisseria meningitidis: protection trial and mass

vaccination results in Cuba. NIPH Ann 1991;14:195-207.

Bjune G, H iby EA, Gronnesby JK, et al. Effect of outer

membrane vesicle vaccine against group B meningococcal disease

in

Norway. Lancet 1991;338:1093-6.

Boslego JB, Garcia J, Cruz C. Efficacy, safety, and

immunogenicity of a meningococcal vaccine group B (15:P1.3)

outer

membrane protein vaccine in Iquique, Chile. Vaccine

1995;13:821-9.

de Moraes JC, Perkins BA, Camargo MCC, et al. Protective

efficacy of a serogroup B meningococcal vaccine in Sao Paulo,

Brazil. Lancet 1992;340:1074-8.

The Meningococcal Disease Surveillance Group. Analysis of

endemic meningococcal disease by serogroup and evaluation of

chemoprophylaxis. J Infect Dis 1976;134:201-4.

Broome CV. The carrier state: Neisseria meningitidis. J

Antimicrob Chemother 1986;18(suppl A):25-34.

Gaunt PN, Lambert BE. Single dose ciprofloxacin for the

eradication of pharyngeal carriage of Neisseria meningitidis. J

Antimicrob Chemother 1988;21:489-96.

Dworzack DL, Sanders CC, Horowitz EA, et al. Evaluation of

single-dose ciprofloxacin in the eradication of Neisseria

meningitidis from nasopharyngeal carriers. Antimicrob Agents

Chemother 1988;32:1740-1.

Darouiche R, Perkins B, Musher D, Hamill R, Tsai S. Levels of

rifampin and ciprofloxacin in nasal secretions: correlation

with

MIC90 and eradication of nasopharyngeal carriage of bacteria. J

Infect Dis 1990;162:1124-7.

Schaad UB, Salam MA, Aujard Y, et al. Use of fluoroquinolones

in pediatrics: consensus report of an International Society of

Chemotherapy commission. Pediatr Infect Dis J 1995;14:1-9.

Schwartz B, Al-Tobaiqi A, Al-Ruwais A, et al. Comparative

efficacy of ceftriaxone and rifampicin in eradicating

pharyngeal

carriage of group A Neisseria meningitidis. Lancet

1988;1:1239-42.

Judson FN, Ehret JM. Single-dose ceftriaxone to eradicate

pharyngeal Neisseria meningitidis. Lancet 1984;2:1462-3.

Abramson JS, Spika JS. Persistence of Neisseria meningitidis

in the upper respiratory tract after intravenous antibiotic

therapy for systemic meningococcal disease. J Infect Dis

1985;151:370-1.
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Table_1

Note:

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landscape and use a small font size.

TABLE. Schedule for administering chemoprophylaxis against meningococcal disease

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Drug	Age group	Dosage	Duration and route of administration *
Rifampin	Children <1 mo	5 mg/kg every 12 hrs	2 days
	Children >= mo	10 mg/kg every 12 hrs	2 days
	Adults	600 mg every 12 hrs	2 days
Ciprofloxacin	Adults	500 mg	Single dose
Ceftriaxone	Children <15 yrs	125 mg	Single IM + dose
Ceftriaxone	Adults	250 mg	Single IM dose

* Oral administration unless indicated otherwise. + Intramuscular.

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