The Epidemiology Of Meningococcal Meningitis

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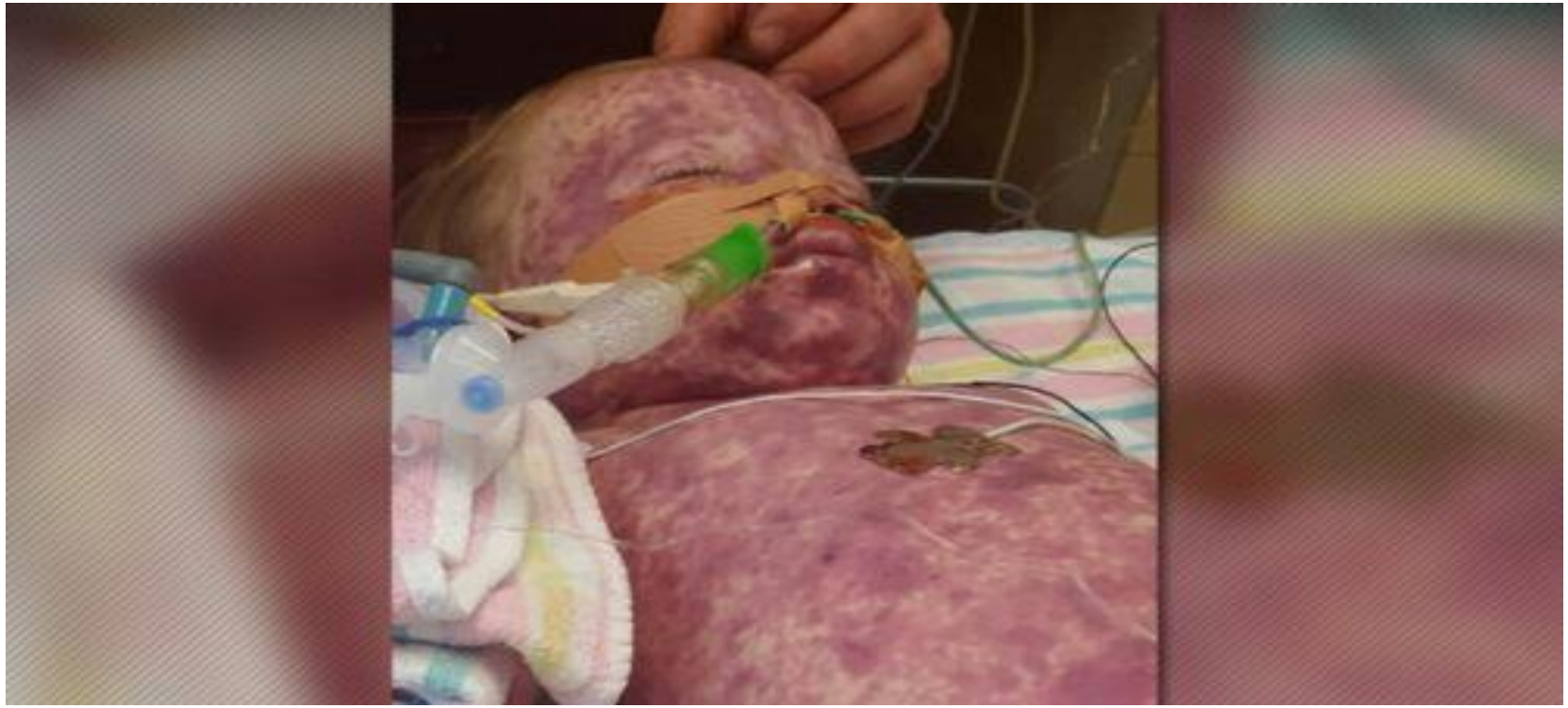


Meningococcal meningitis or cerebrospinal fever

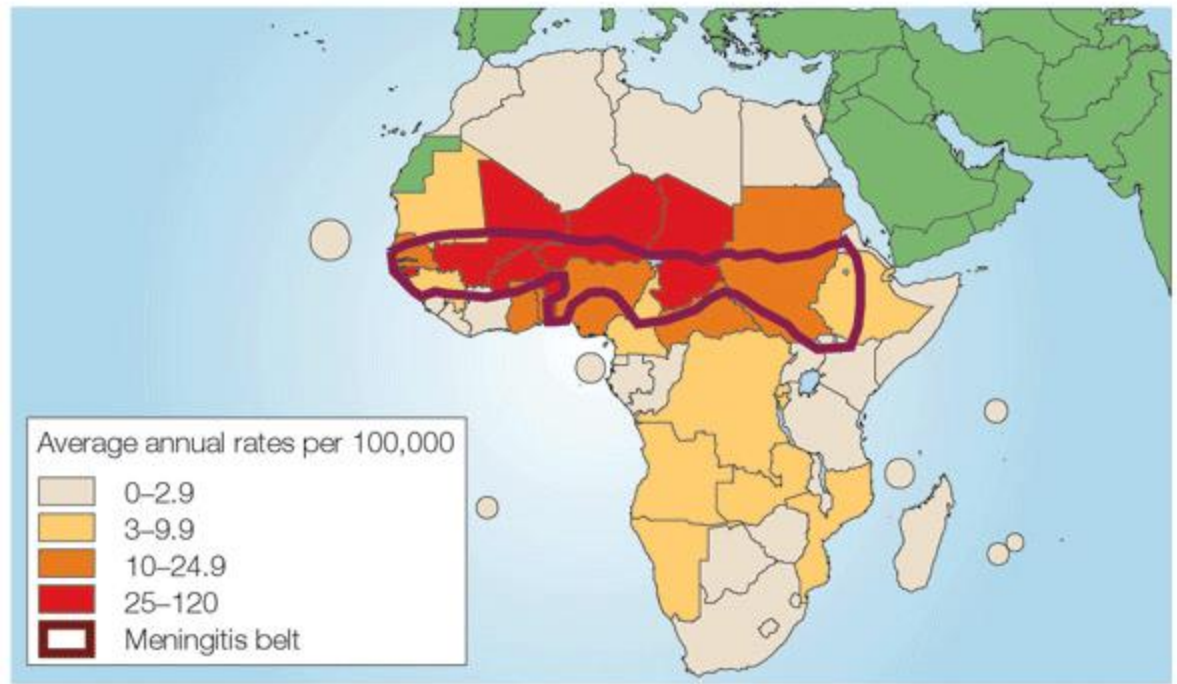
- is an acute communicable disease caused by Neisseria meningitidis.
- It usually begins with intense headache, vomiting and stiff neck and progresses to coma within a few hours.

- The meningitis is part of a septicemic process.
- The fatality of typical untreated cases is about 80 per cent.
- With early diagnosis and treatment, case fatality rates have declined to less than 10 per cent.

Problem statement

- Distribution worldwide, occurring sporadically and in small outbreaks in most parts of the world.
- In some regions this endemic situation may alternate with devastating, unpredictable epidemics.

- This is the case in the African meningitis belt, which is the region in sub-Saharan Africa stretching from Senegal in the west to Ethiopia in the east.
- This region is inhabited by around 400 million people.
- In the African meningitis belt, the WHO definition of a meningococcal epidemic is > 100 cases per 100,000 population per year.



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- In the endemic countries, the incidence of
- > 10 cases per 100000 high endemicity
- 2-10 cases per 100000 moderate endemicity
- <2Case per 100000 low endemicity.

An outbreak outside the meningitis belt

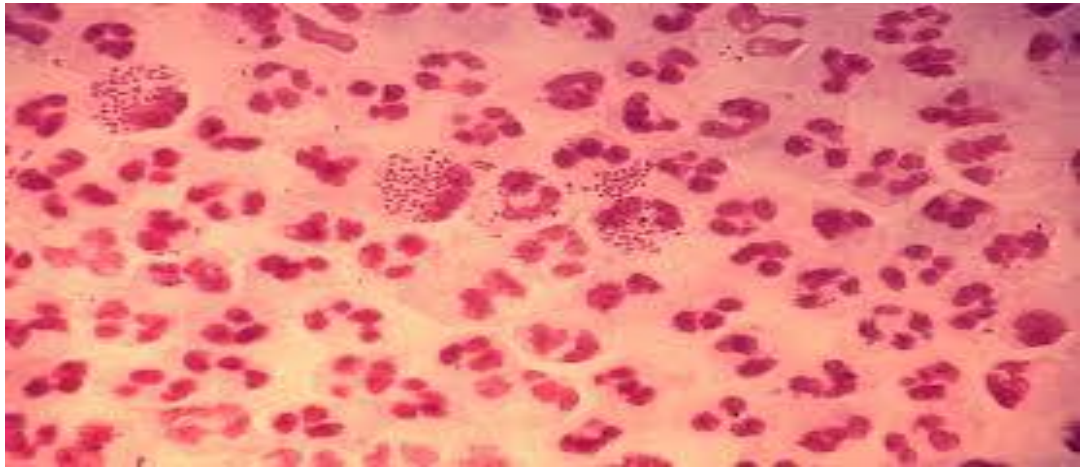
- may be defined as a substantial increase in invasive meningococcal disease in a defined population above that which is expected by place and time.

- During recent years, several serious outbreaks affecting numerous countries have occurred in tropical and temperate zones of other continents, viz, Americas, Asia and Europe.
- In Europe, the incidence of disease ranges from 0.2 to 14 cases per 100,000 population and majority cases are caused by serogroup B strains.
- In Americas, the incidence of disease is in the range of 0.3 to 4 cases per 100,000 population.

- In United States, the majority cases are caused by serogroups B, C and Y.
- In Asia most meningococcal disease is caused by meningococci belonging to serogroup A or C

Epidemiological features

- (a) AGENT : The causative agent, N. meningitidis is a gram-negative diplococci.
- 12 serotypes have been identified, viz. Groups A, B, C,29E, H, I, K, L, W135, X, Y, Z based on the structure of the polysaccharide capsule.
- The majority of invasive meningococcal infections are caused by organisms of serogroups A, B, C, X, W135 and Y



Agent(cont.)

- Meningococci of these serogroups have the potential to cause both endemic disease and outbreaks.
- In African meningitis belt, subgroup A has been the most important cause of disease.
- N. meningitidis is a delicate organism; it dies rapidly on exposure to heat and cold.

SOURCE OF INFECTION:

- The organism is found in the nasopharynx of cases and carriers.
- Clinical cases present only a negligible source of infection.
- More often the infection causes mild or even unnoticeable symptoms of nasopharyngitis.

SOURCE OF INFECTION(Cont.):

- 4 to 35 per cent of the normal population may harbor the organism in the nasopharynx during inter epidemic periods.
- Carriers are the most important source of infection.
- The mean duration of temporary carriers is about 10 months.
- During epidemics, the carrier rate may go up to 70-80 per cent.

PERIOD OF COMMUNICABILITY :

- Until meningococci are no longer present in discharges from nose and throat.
- Cases rapidly lose their infectiousness within 24 hours of specific treatment.

AGE AND SEX :

- This is predominantly a disease of children and young adults.
- Both sexes.
- With highest attack rate in infants aged 3-12 months.

IMMUNITY

- All ages are susceptible.
- Younger age groups are more susceptible than older groups as their antibodies are lower.
- Immunity is acquired by subclinical infection (mostly), clinical disease or vaccination.
- Infants derive passive immunity from the mother.

ENVIRONMENTAL FACTORS :

- The seasonal variation of the disease is well established; outbreaks occur more frequently in the dry and cold months of the year from December to June.
- Overcrowding, as occurs in schools, barracks, refugee and other camps, is an important predisposing factor.

The incidence is also greater in:

- the low socio-economic groups living under poor housing conditions,
- with exposure to tobacco smoke,
- asplenia,
- HIV infection
- and travel to endemic areas.

- Mode of transmission :The disease spreads mainly by droplet infection.
- The portal of entry is the nasopharynx.
- Incubation period: Usually 3 to 4 days, but may vary from 2 to 10 days.

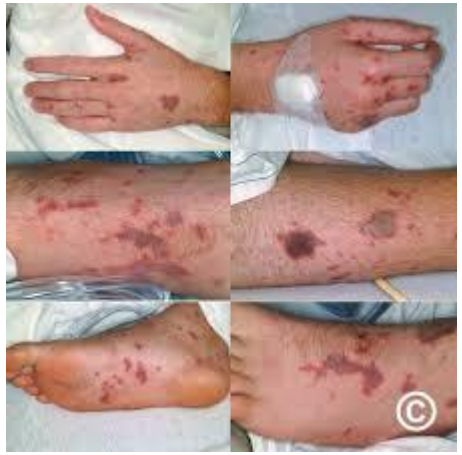
Clinical course

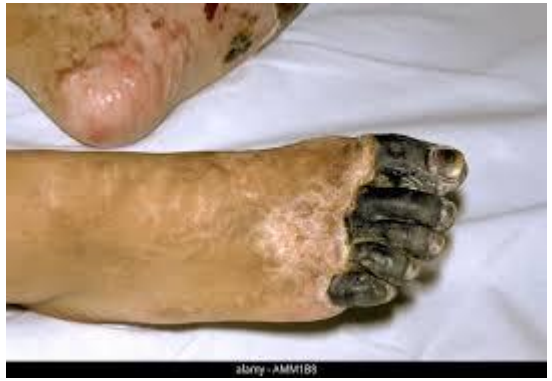
- Most infections do not cause clinical disease.
- Many infected people become asymptomatic carriers of the bacteria and serve as a reservoir and source of infection for others.
- In general, susceptibility to meningococcal disease decreases with age.
- Meningococcal meningitis has a sudden onset of intense headache, fever, nausea, vomiting, photophobia, stiff neck and various neurological signs.

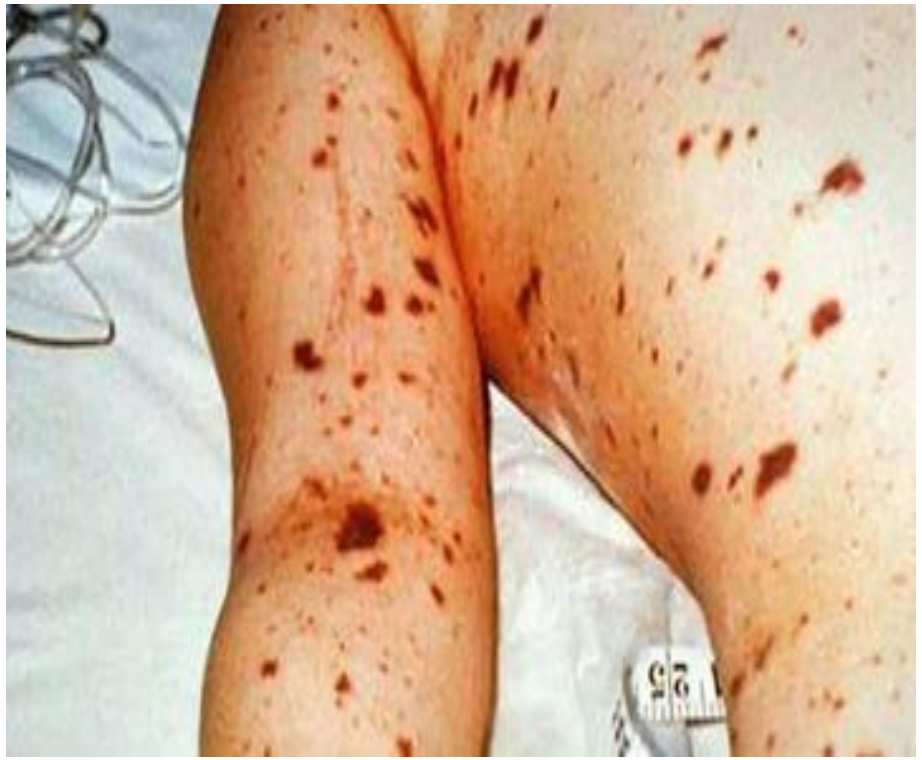
Clinical course(cont.)

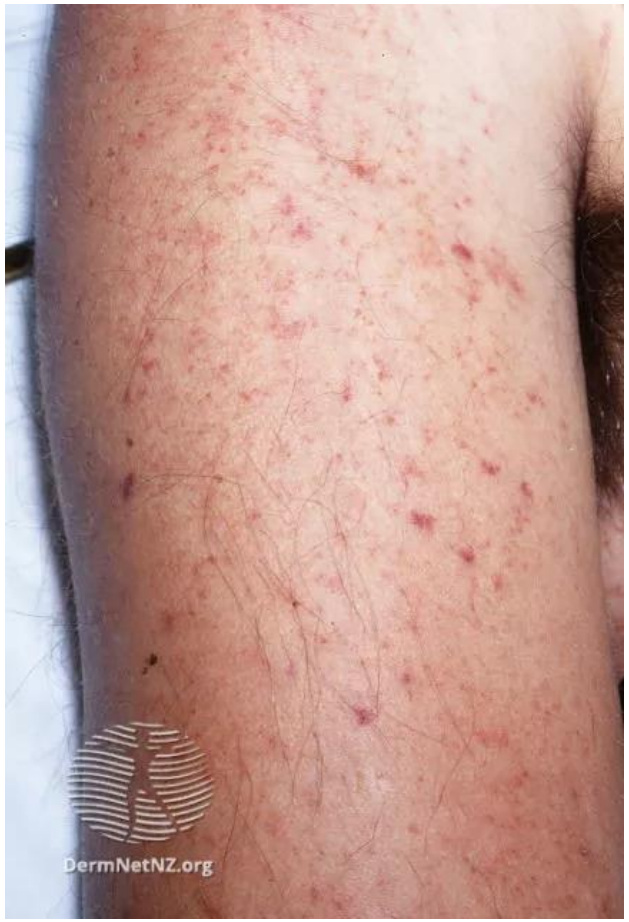
- The disease is fatal within 24-48 hours in 5-10 per cent of cases even with prompt antimicrobial treatment in good health care facility.
- Among individuals who survive, up to 15-20 per cent have permanent neurological sequelae.
- Meningococcal septicemia, in which there is rapid dissemination of bacteria in the bloodstream, is a less common form of meningococcal disease, characterized by circulatory collapse, hemorrhagic skin rash and high fatality rate

SKIN RASH CAN COALESE FOR HAEMORRHAGIC AREA AND GANGRENE



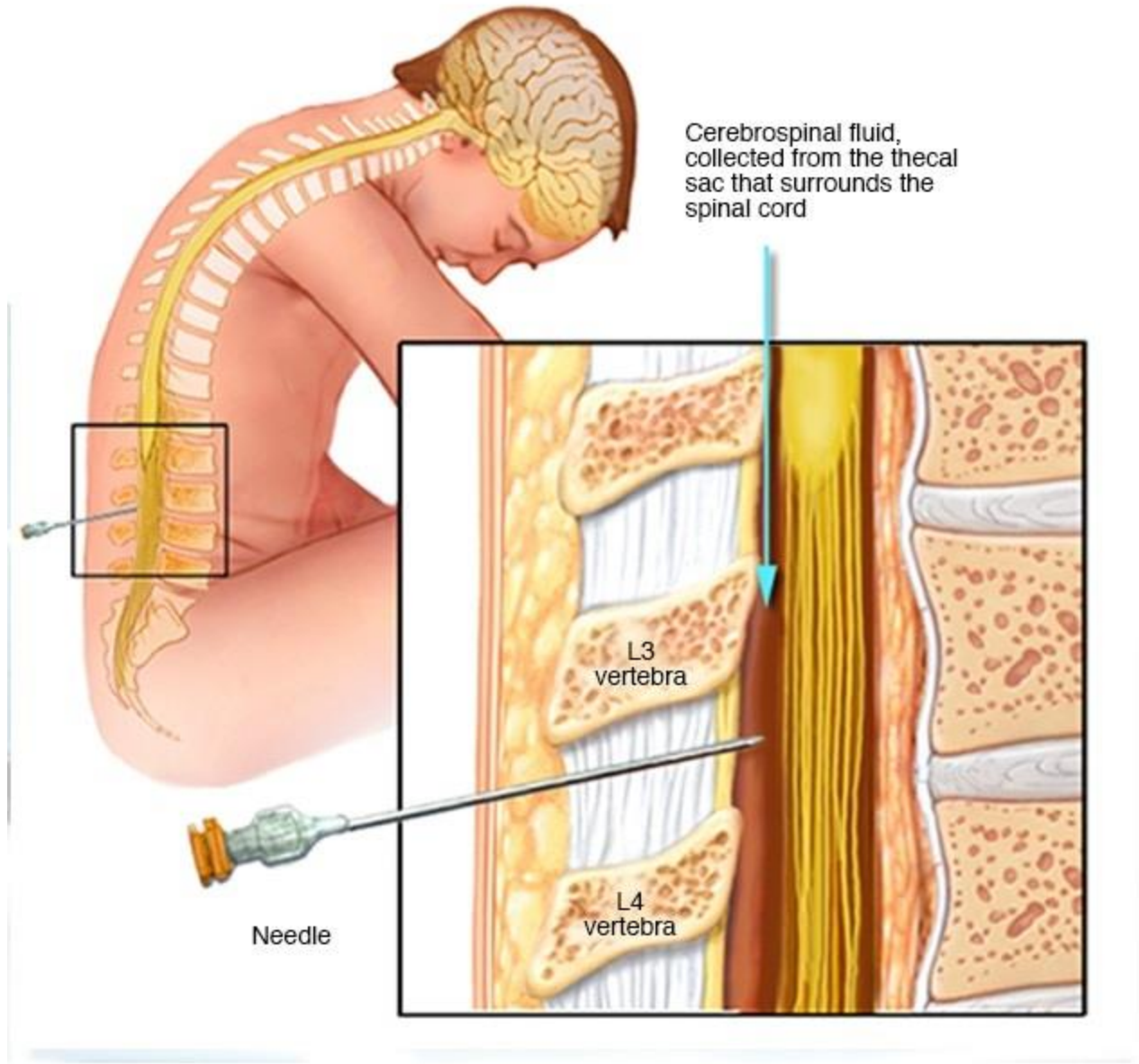






Diagnosis

- Initial diagnosis - Clinical Examination followed Lumbar Puncture (LP)
- LP- purulent spinal fluid (CSF)
- The bacteria can sometimes be seen in microscopic examinations of the spinal fluid.
- Confirmed by growing the bacteria from specimens of spinal fluid or blood - by agglutination tests or by Polymerase Chain Reaction (PCR).


Cerebrospinal fluid, collected from the thecal sac that surrounds the spinal cord
L3 vertebra
L4 vertebra
Needle

Prevention and control

- (a) CASES : Treatment with antibiotics can save the lives of 95 per cent of patients provided that it is started during the first 2 days of illness.
- Penicillin is the drug of choice.
- In penicillin-allergic patients, ceftriaxone and other third generation cephalosporins should be substituted.
- A single dose of long-acting chloramphenicol or cetriaxone is used for treatment of epidemic meningococcal meningitis in sub Saharan Africa.

Control of Cases(cont.)

- Septicemic shock and raised intracranial pressure in meningitis are particular problem in the management of meningococcal disease.
- Treatment of cases has practically no effect on the epidemiological pattern of the disease because it only reduces the fatality rate of the disease according to the treatment efficiency.
- Isolation of cases is of limited usefulness in controlling epidemics because the carriers outnumber cases.

Control of CARRIERS :

- Treatment with penicillin does not eradicate the carrier state; more powerful antibiotics such as rifampicin are needed to eradicate the carrier state

Control of CONTACTS :

- Close contacts of persons with confirmed meningococcal disease are at an increased risk of developing meningococcal illness.
- Antibiotics are effective in preventing additional cases through eradicating carriage of the invasive strain.
- Most secondary case occur within the first 72 hours after presentation of the index case; risk of secondary disease decreases to near baseline by 10-14 days.
- Close contacts include household, child care, and preschool contacts.

Control of CONTACTS(Cont.)

- In outbreaks involving limited populations, those with direct, prolonged contact with a case of meningococcal disease may also be offered clearance treatment.
- Ideally, where indicated, treatment should be started within 24 hours of identification of the index case.
- Antibiotics effective for this purpose include rifampicin, ciprofloxacin, ceftriaxone or azithromycin.

MASS CHEMOPROPHYLAXIS

- :This is in fact mass medication of the total population some of which are not infected.
- It is recommended that mass chemoprophylaxis be restricted to closed and medically supervised communities.
- Mass treatment causes an immediate drop in the incidence rate of meningitis and in the proportion of carriers.
- The efficacy of this preventive measure depends to a large extent on the population coverage.
- The drugs of choice are ciprofloxacin, minocycline, spiramycin and ceftriaxone.

VACCINE

- Currently available meningococcal vaccines include polysaccharide vaccines and polysaccharide-protein conjugate vaccines.
- The conjugate vaccines are more immunogenic and also induce immunogenic memory.
- Both vaccines are available against meningococci of serogroup A, C, W135 and Y.

Polysaccharide vaccine

Polysaccharide vaccines

- Internationally marketed meningococcal polysaccharide vaccines are available in bivalent (A, C), trivalent (A,C, W 135), and quadrivalent (A, C, W135, Y) formulations.
- The vaccines contain 50 μg of each of the individual polysaccharides.
- Meningococcal polysaccharide vaccines are administered as a single dose to persons ≥2 years old;

Polysaccharide vaccines(cont.)

- Most of these vaccines are given subcutaneously.
- Adverse reactions to polysaccharide meningococcal vaccines are usually mild; the most frequent reaction is 1-2 days of pain and redness at the site of injection, which occur in 4%-56% of vaccine recipients.
- Transient fever is reported in<5% of recipients.

Conjugate vaccine

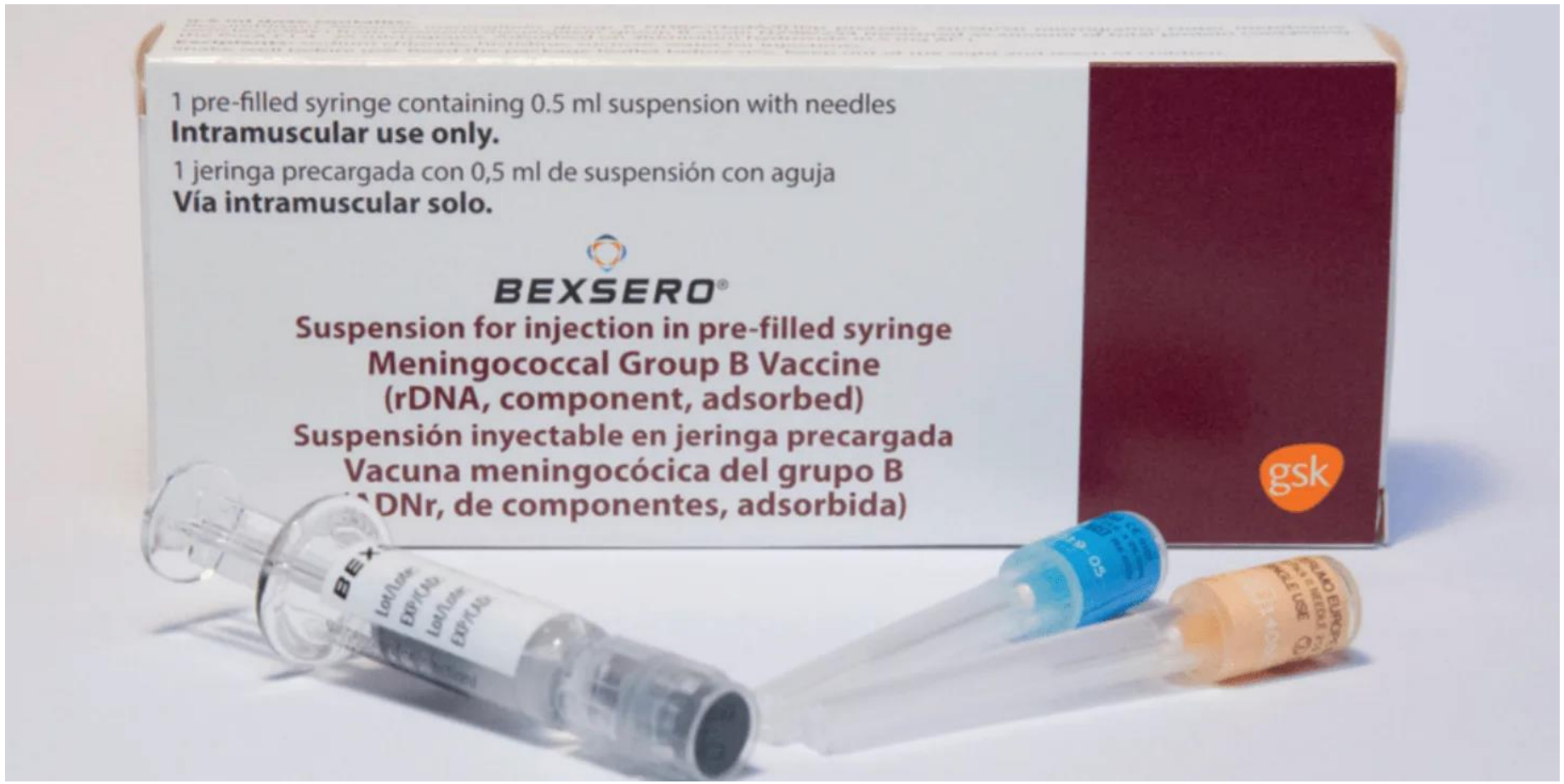
Conjugate vaccines :

- Licensed meningococcal conjugate vaccines are monovalent (A or C) or quadrivalent (A, C, W135, Y),
- and also include a combination vaccine based on Haemophilus influenzae type b and Neisseria meningitidis serogroup C vaccines (Hib/MenC).
- Conjugate vaccine should be given as intramuscular injection, preferably in the deltoid muscle (or in the anterolateral aspect of the upper thigh in children .

- Monovalent Men A conjugate vaccine should be given as a single dose to individuals 1-29 years of age.
- For monovalent Men C conjugate vaccine, one single intramuscular dose is recommended for children aged 2 12 months, teenagers and adults.
- Children 2-11 months of age require 2 dose administration at an interval of at least 2 months and a booster about 1 year thereafter.
- Quadrivalent vaccines are administered as a single dose to individuals aged ≥2 years.

- Meningococcal vaccines should be stored at 2-8°C.
- Conjugate vaccines are preferred over polysaccharide vaccines due to their potential for herd protection and their increased immunogenicity, particularly in children < 2 years of age.
- Both vaccines are safe when used during pregnancy.
- WHO recommends that countries with high or medium endemic rates of invasive meningococcal disease and countries with frequent epidemics should introduce appropriate large-scale programmes.

- all Hajj and Umrah pilgrims aged one year and older are required by KSA to receive quadrivalent meningococcal vaccine.


1 pre-filled syringe containing 0.5 ml suspension with needles
Intramuscular use only.
1 jeringa precargada con 0,5 ml de suspensión con aguja
Vía intramuscular solo.
BEXSERO®
Suspension for injection in pre-filled syringe
Meningococcal Group B Vaccine
(rDNA, component, adsorbed)
Suspensión inyectable en jeringa precargada
Vacuna meningocócica del grupo B
DNr, de componentes, adsorbida)
gsk

BEXSERO(LICENSED SINCE 2015)

- is a vaccine approved for 10- through 25-year-olds to prevent meningococcal group B disease (also known as meningitis B) caused by Neisseria meningitidis bacteria.
- Vaccination with BEXSERO can be completed with 2 or 3 doses.
- Help protect teen against meningitis B.

REFERENCE :park's textbook of preventive and social medicine 23rd edition