Meningococcal Disease: Public health burden and control

History of the disease
Meningococcal disease was described as far back as 1805 when an outbreak swept Geneva, Switzerland. However, the causative agent of meningococcal meningitis was identified only in 1887. Major outbreaks were subsequently noted during the two world wars and epidemics have been recognized on the African continent since 1909.

Today few diseases cause the fear that develops when meningitis strikes a community. Epidemic meningitis is one of the most devastating medical emergencies and the ensuing socioeconomic implications can be disruptive for both public health and the community.

The disease
Meningococcal disease is a contagious bacterial disease caused by the meningococcus (Neisseria meningitidis) and is the only form of bacterial meningitis to cause epidemics. Transmission occurs by direct contact, including respiratory droplets from the nose and throat of infected persons. Most infections are sub-clinical and many infected people become carriers without discernable symptoms. Twelve serogroups are currently recognized, however serogroups A, B and C are responsible for the vast majority of cases.

The disease is potentially fatal, and even in affluent countries with well-organized health care, 5-10% of patients die and about fifth of those who do survive will suffer from significant neurological dysfunctions, including deafness, palsies and seizures, as well as mental disorders. The disease may also cause loss of limbs. Meningococcal septicaemia, in which bacteria are found in the blood stream, is less common but highly fatal even when actively treated.

Magnitude of the problem
Meningococcal disease occurs globally. Although effective, nontoxic and affordable antibiotics are available, the disease is still associated with a very high mortality and persistent neurological defects, particularly among infants and young children.

Epidemic meningitis may occur in any part of the world, but the largest and most frequently recurring outbreaks have been in the semi-arid area of sub-Saharan Africa. This area, known as “the meningitis belt” stretches from Senegal to Ethiopia and includes all or part of at least 15 countries, with an estimated total population of approximately 300 million. The most recent meningococcal meningitis pandemic, which began in the mid-1990s, has so far resulted in approximately 350 000 cases and thousands of deaths. In 1996, almost 190 000 cases in Mali, Niger, Nigeria, Burkina
Faso, Chad, and other countries paralyzed medical care systems and exhausted international vaccine supplies.

The socioeconomic implications of epidemic meningitis are alarming. Control and prevention of the disease require a massive amount of vaccine, medicines and logistical support from the national health authorities of the affected countries. Most countries face great difficulty in responding appropriately to these needs. In addition, routine health services and other important activities are disrupted.

Factors favouring epidemics
Climatic conditions play an important role in the seasonal upsurge of meningococcal disease. Peak activity occurs generally during periods of low humidity, such as the winter in temperate climate zones and the dry season in Africa. Drought and dust
storms in sub-Saharan Africa can help further the spread of infection while the onset of the rainy season often leads to the end of the epidemic.

Other factors linked to a higher incidence of meningococcal disease are poor living conditions and overcrowded housing. Travel and migration also facilitate the circulation of virulent strains inside a country or from country to country and large population movements such as pilgrimages may play a major role in the spread of infection. Other large population displacements, e.g. those of refugees, may pose similar risks. Waning herd immunity to a particular strain in a population may be necessary for an outbreak to occur and could contribute to the regularity of epidemic cycles in sub-Saharan Africa.

**Prevention, treatment and control**

Meningococcal disease is frequently fatal and should always be viewed as a medical emergency. Antimicrobial therapy must be instituted as quickly as possible. A range of drugs are available: penicillin G, ampicillin, chloramphenicol, oily chloramphenicol, and ceftriaxone. Oily chloramphenicol is the drug of particular value in areas with limited health facilities. Chemoprophylaxis can be considered for people in close contact with patients in the endemic situation, however it is not an effective means of interrupting transmission during an epidemic. Epidemics of meningococcal meningitis usually spread rapidly and may last for several months in the absence of vaccination. Polysaccharide vaccines are available against serogroups A, C, Y and W135, and mass immunisation campaigns that reach at least 80% of an entire population with serogroup A and C vaccine can halt an epidemic caused by meningococci of these serogroups.

**From epidemic response to epidemic preparedness**

As very few of the affected countries in Africa were adequately prepared to cope with epidemic emergencies, the need to reinforce national capacity for preparedness, detection and control of epidemic meningitis has been recognized internationally.

To respond to this challenging situation and to the expected spread of the disease, WHO, in collaboration with its Member States and various governmental and non-governmental agencies, has developed a sustainable plan of action for preparedness and control of meningococcal disease in African and Eastern Mediterranean Regions. This initiative focuses on strengthening national and regional health systems in the following key areas:

- surveillance of communicable diseases for timely detection of outbreaks;
- laboratory capacity for diagnosis of communicable diseases and rapid confirmation of outbreaks;
- creation of a contingency stock of vaccine, antibiotics and injection materials and establishment of a revolving fund to ensure immediate availability of these materials in emergencies;
- production of guidelines for the use of vaccine and protocols for appropriate case management.

While this international initiative was triggered in response to a crisis in vaccine supply for the control of severe epidemics of meningitis in Africa, it now ensures advance preparation for epidemics, with better surveillance to detect outbreaks promptly, and supplies ready for immediate dispatch to affected countries.
Global partnerships
As part of the WHO initiative for preparedness and control of epidemics in Africa, the International Coordinating Group on Vaccine Provision for Epidemic Meningitis Control (ICG) was set up to coordinate the best use of the limited amount of vaccine available, to ensure that the meningitis vaccine was used where it was needed most and that wastage was avoided. The ICG is composed of representatives of UNICEF, the International Federation of the Red Cross and Red Crescent Societies (IFRC), Medecins Sans Frontières (MSF) and WHO, as well as technical partners from WHO Collaborating Centres and manufacturers of meningitis vaccine, antibiotics and autodestruct syringes.

The objectives of the ICG are:
• To ensure the availability and rational distribution of emergency supplies of meningococcal serogroup A and C vaccine to countries experiencing epidemic meningococcal meningitis;
• to ensure timely availability of vaccine in countries experiencing epidemics;
• to coordinate international efforts in preparing for, and responding to, epidemic meningitis.

Other WHO meningococcal meningitis programme activities. Ongoing activities include:
• Operational research to determine best strategies for deploying meningitis vaccine;
• development of treatment, laboratory and epidemic control guidelines;
• laboratory strengthening to ensure prompt and accurate diagnosis;
• surveillance to gain more information on the occurrence of meningococcal disease and give a rapid alert for epidemics.

Conclusion
To reduce the impact of meningitis epidemics, adequate preparedness is crucial. Preparedness includes carrying out thorough disease surveillance in countries at risk, having facilities available to rapidly confirm the diagnosis and having ready sufficient stocks of meningococcal meningitis vaccine, oily chloramphenicol and single-use syringes for efficient distribution. If such a mechanism is in place, many cases of meningitis as well as some of the fatalities resulting from the disease can be avoided.

WHO invites all willing partners to participate in this critical initiative.

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