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Managing pertussis outbreaks during humanitarian emergencies

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Preface

The purpose of this technical note is to provide health professionals in United Nations agencies, non-governmental organizations, donor agencies and local authorities working with populations affected by emergencies with up-to-date technical guidance on the management of pertussis outbreaks in emergency-affected populations.

The prevention and control of communicable diseases such as pertussis represent a significant challenge to those providing health-care services in evolving situations. It is hoped that this technical note will facilitate activities to control communicable diseases among agencies working with emergency-affected populations.

Background

Pertussis, or whooping cough, is a disease of the respiratory tract caused by the bacteria *Bordetella pertussis*. The disease is most dangerous in infants and is an important cause of infant death worldwide, even in countries with high vaccination coverage. Recent estimates from WHO indicate that, in 2003, about 17.6 million cases of pertussis occurred worldwide, 90% of which were in developing countries, and that about 279 000 patients died from this disease.

Clinical manifestations and transmission

Following an incubation period of 7–10 days, patients (mostly children aged <5 years) develop catarrhal symptoms including cough. In the course of 1–2 weeks, coughing paroxysms ending in the classical "whoop" may occur. In typical cases, cough is particularly severe at night and frequently followed by vomiting. In young infants, pertussis may cause only apnoea and cyanosis. In adolescents and adults, an uncharacteristic, persistent cough may be the only manifestation of the disease. In older children, adolescents and adults, pertussis is often unrecognized because of its frequent atypical course. The catarrhal, paroxysmal and convalescent stages of the disease may last from one to several months.

B. pertussis is transmitted from infected to susceptible individuals through droplets. In its early catarrhal stage, pertussis is highly infectious, with a secondary attack rate of up to 90% among non-immune household contacts. Untreated patients may be contagious for 3 weeks or more following the onset of symptoms, although communicability diminishes rapidly after the catarrhal stage. Older age groups represent an important source of infection for susceptible infants.

The clinical outcome of pertussis depends on factors such as age and vaccination status. In industrialized countries, lethality of pertussis is very low (<1/1000), whereas in developing countries the average lethality is estimated at 3.9% in infants and 1% in children aged 1–4 years. Severe disease and death are reported mainly in non-immune, very young infants. In malnourished, unvaccinated populations with a high prevalence of co-infections, case-fatality ratio (CFR) can reach 15%.[1] Complications occur in 5–6% of pertussis cases, most frequently in infants aged <6 months. Bronchopneumonia is the most prominent problem, with relatively high lethality. The incidence of pertussis-associated encephalopathy is 0.9/100 000.

Antibiotic treatment

Macrolide antibiotics such as erythromycin or azithromycin may prevent or moderate clinical pertussis when given during the incubation period or in the early catarrhal stage. Trimethoprim-sulfamethoxazole is an alternative antibiotic for patients who cannot tolerate macrolides. During the paroxysmal phase of the disease, antimicrobial drugs will not change the clinical course but may eliminate the bacterium from the nasopharynx and thus reduce transmission.

Laboratory

Etiological diagnosis is based on recovery of *B. pertussis* from nasopharyngeal specimens obtained during the catarrhal and early paroxysmal stages. WHO considers bacterial culture the “gold standard” of laboratory confirmation. However, bacterial culture is not very sensitive (<60%) and requires selective culture media. Polymerase chain reaction is more sensitive and can be performed on the same biological samples as the ones used for culture, but is used mainly in

specialized laboratory settings. Serological diagnosis is ideally based on detection of a significant increase in the level of specific antibodies in paired sera of infected individuals. The sera should be collected in the early catarrhal stage (acute serum) and about one month later (convalescent serum). High antibody levels in sera from non-vaccinated individuals suggest recent infection.

Vaccines

All infants, including HIV-positive individuals, should be immunized against pertussis. Except for cases where prior pertussis vaccination resulted in anaphylactic reaction, there are no strict contraindications to this vaccine. There are no data to support the perception that previous encephalitis may be a contraindication for pertussis vaccination.

Despite its efficient prevention of clinical disease, the vaccine has limited impact on the circulation of *B. pertussis* even in countries with high vaccination coverage. Remaining non-immunized children and older individuals with waning immunity may serve as reservoirs for the infection and transmit *B. pertussis* to non-immunized young infants. Furthermore, the considerable numbers of susceptible adolescents and adults allow the occurrence of pertussis outbreaks, although high vaccination coverage may prolong the inter-epidemic intervals[2].

Outbreaks of pertussis in humanitarian emergencies

Outbreaks are common in settings of population displacement, but documentation and evidence for action are rare, likely due to the difficulties with laboratory confirmation of suspected pertussis cases. Risk factors for transmission in these settings include crowding, malnutrition, and co-infection with other illnesses (HIV, malaria, tuberculosis, etc).

An outbreak in the Democratic Republic of the Congo (DRC) in 2000 involved 1136 cases including 23 (2%) deaths. Cases were defined as having coughing fits, vomiting after coughing, and characteristic "whooping". Vaccination coverage (DTP1) of infants < 12 months in the affected area was estimated to be 32%. Response activities consisted of case management support with provision of erythromycin, active surveillance, and strengthening of routine EPI services. A vaccination campaign following the outbreak was not well-accepted by the population, due to fears of secondary effects[3].

Another outbreak of pertussis in DRC in 2001 involved 2633 cases, including 17 (0.6%) deaths, detected by active surveillance. Eighty-nine percent of the cases were ≤5 years of age. Cases were defined as having the characteristic coughing fits, "whooping", and vomiting after coughing for ≤ 2 weeks (suspect case) or longer than 2 weeks (probable case). Suspect cases were treated with