Vaccine-Preventable Bacterial Meningitis Program in Ukraine

Background
In January 2002, the Ukraine Ministry of Health, the Kyiv City Health Administration, and PATH initiated a two-year program of population-based surveillance to determine the incidence and major causes of bacterial meningitis among children less than five years of age in the city of Kyiv. The program also included a prevalence study to estimate the nasopharyngeal carriage rate of Haemophilus influenzae type b (Hib) bacteria in healthy children.

Rationale for the program
The purpose of this program was to support and strengthen Ukraine’s existing surveillance system for pediatric bacterial meningitis and to determine the epidemiologic burden of these diseases in Ukraine. While studies have established that, worldwide, Hib is one of the most common causes of pediatric bacterial meningitis, along with pneumococcus and meningococcus, this study will provide essential data on the burden of these pathogens in a region of the world where little documentation of their incidence is available. Establishing this data is important because safe and effective vaccines against all three bacterial pathogens are available; thus, most childhood cases of bacterial meningitis and pneumonia are preventable through infant immunization. As these vaccines are more expensive than those currently used in routine infant immunization schedules, Ukraine and other countries in the region must document the burden and etiology of bacterial meningitis and pneumonia to determine the most cost-effective vaccine introduction strategies for their countries.

The study
The study is being carried out in three pediatric hospitals in Kyiv, Ukraine, that diagnose and treat virtually all meningitis cases in the city. To strengthen laboratory capacity, PATH provided diagnostic tests and transport media to the hospital labs, while also providing support to a central reference laboratory for confirmatory testing and culturing and typing of isolates at the national microbiology reference laboratory. PATH arranged for laboratory personnel to receive training from the British Public Health Laboratory Service Haemophilus Reference Unit. Additional training in DNA extraction and Polymerase Chain Reaction (PCR) testing was provided by the National Public Health Institute of Finland.

Study activities
PATH staff designed data forms and collected data monthly. Case information was abstracted from hospital records by pediatricians working under the direction of the Chief Pediatric Immunologist of Ukraine. PATH and Ukrainian epidemiologists are now conducting analyses of incidence for the principal conditions and endpoints (i.e., probable and confirmed bacterial meningitis). All data will remain the property of the Government of Ukraine.
In addition to the principal surveillance activities, several corollary studies are being undertaken. For example, PATH and Ukrainian researchers are currently collaborating on a nasopharyngeal carriage study to determine the prevalence of Hib in this population. Nasopharyngeal swabs are being obtained from healthy children and cultured according to standard protocols. The results of this study will serve both to establish the presence of Hib among children and to establish the culture and diagnostic techniques to be used during the surveillance period.

The study will also monitor antimicrobial resistance patterns for these three bacterial species. As part of this research, the study will prospectively measure the presence of antimicrobial substances in cerebrospinal fluid (CSF) and urine specimens of children admitted with meningitis, to document prior antimicrobial agent use. These data will be compared with data derived from standard clinical histories.

Finally, the surveillance data obtained by the study have assisted Ukraine in a project with the World Health Organization (WHO) to validate the newly developed Rapid Assessment Tool (RAT) for estimating the impact of Hib disease on the population. Using assumptions based upon surveillance findings in Ukraine, the new WHO-developed RAT and costing procedures were conducted during an assessment in 2003 to estimate the impact and cost of both meningitis and pneumonia due to Hib. This research will lead to the development of simpler methods for estimating pneumococcal burden that can be used in diverse settings and permit decision makers to determine the need for vaccine introduction. A final report of these activities will be made available by June 2005.

Local partners
Pediatric Infectious Disease Department, Kyiv Medical Academy of Postgraduate Study; National Bacteriological Laboratory of the Central Sanitary and Epidemiological Station; Department for Prevention of Infectious Diseases, Ministry of Health of Ukraine.

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