

Crossing Borders: One World, Global Health

Rotavirus Enteritis in Dadaab Refugee Camps: Implications for Immunization Programs in Kenya and Resettlement Countries

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Dadaab refugee camp, established in Kenya in 1991, is host to >500 000 refugees, most of whom are Somali in origin [1]. Annually, the United States resettles approximately 11 000 refugees from Africa, 4000 of them from Kenya. Although substantial progress has been made to provide safe water and improve sanitation in Dadaab, diarrheal disease remains among the leading causes of morbidity and mortality. Several disease outbreaks, including hepatitis E virus [2], cholera [3], and wild poliovirus [4], have been attributed to poor sanitation in the camps.

Rotavirus enteritis is an acute viral infection that is transmitted by the fecal–oral route and affects nonimmune people, particularly children <5 years old [5, 6]. Rotavirus causes severe diarrhea in young children, particularly in developing countries, and contributes to high childhood mortality [5]. Rotavirus infects nearly every child by the age of 3–5 years. Severe rotavirus enteritis is, however, preventable through vaccination early in life. To date, 53 countries have implemented routine vaccination against rotavirus, including 12 in Africa (Botswana, Burkina Faso, Burundi, Ethiopia, The Gambia, Ghana, Malawi, Mali, Rwanda, South Africa, Tanzania, and Zambia) [7]. The role of rotavirus as a cause of diarrhea in refugee settings has

not been well established, and such data are vital to inform policy on use of rotavirus vaccines in these settings. We therefore sought to determine the relative contribution of rotavirus to diarrheal illness among children <5 years old in a refugee camp.

Surveillance among refugee populations is an important part of controlling diseases in Kenya and in countries where active resettlement is occurring. The Kenya Medical Research Institute and the Centers for Disease Control and Prevention established a respiratory disease surveillance program in Dadaab refugee camp in 2006. Diarrheal disease surveillance was initiated in 2011 to assess infectious causes of illness. To determine the relative contribution of rotavirus to diarrheal illness among children in Dadaab refugee camps, stool samples were collected from all children <5 years old with acute diarrhea (defined as ≥ 3 loose stools in 24 hours) at the health facilities (1 hospital and 4 health posts) in Dadaab's Hagadera refugee camp from January to December 2011. Patients whose parents did not consent and children <1 week old were excluded. The stool samples were transported to the laboratory at 4°C–8°C within 4–6 hours of collection and were tested for rotavirus by Premier Rotaclone enzyme immunoassay.

Of 424 children tested, 98 (23.1%) were confirmed to be infected with rotavirus. Rotavirus infection was more common among hospitalized children (89.8%; 95% confidence interval [CI], 83.8%–95.8%) than among those treated as outpatients (10.2%; 95% CI, 4.2%–16.2%). Rotavirus equally affected boys (49%) and girls (51%). The median age of

children infected with rotavirus was 10 months (range, 2–48 months). Rotavirus positivity was most common in the 16-week to 16-month age group ($n = 67$ [68%], $P < .01$). Even though we could not establish seasonality due to the limited duration of surveillance, we found that rotavirus was circulating throughout the year.

Although poor sanitation and hygiene are generally thought to be responsible for most diarrheal illness in refugee camps [8, 9], our surveillance showed that rotavirus is an important cause of severe endemic diarrheal disease among Somali children in Dadaab refugee camp. Our surveillance also showed that rotavirus was circulating throughout the year, unlike in temperate climates, where it is associated with winter [5]. Further studies are required to determine the genotype of the circulating rotavirus strains in Dadaab refugee camp, particularly to establish if unusual strains may be imported to resettlement countries [10].

The finding of rotavirus as a major cause of severe endemic diarrheal illness among children in Dadaab refugee camp has important implications for vaccine policymakers and healthcare providers, particularly those serving refugees in resettlement countries and in Kenya. Because vaccination in camp settings can be challenging, the feasibility and effectiveness of providing vaccine through campaigns need further evaluation.

Editorial comment (C. B.). Millennium developmental goal 4 (MDG4) calls for a two-thirds reduction in childhood mortality from the 1990 baseline by 2015. While many factors contribute to mortality in children under 5, among infectious

causes respiratory and diarrheal diseases are important. Thus, strategies that reduce deaths from diarrhea in children are essential for attaining MDG4 goals.

Rotavirus vaccine is effective in reducing severe rotavirus-associated diarrhea and child mortality [11]. The World Health Organization (WHO) recommends that rotavirus vaccine be included in national immunization programs as part of a diarrheal disease control strategy [12]. Because most rotavirus infections occur early in life, timely administration of the vaccine is necessary before a large target population is naturally infected. WHO recommends rotavirus vaccine administration along with the vaccines for diphtheria, pertussis, and tetanus (DPT1, DPT2, and DPT3) at 6, 10, and 14 weeks of age [5]. Kenya plans to introduce rotavirus vaccination (Rotarix) in the routine immunization schedule in July 2014 [13].

Along with the provision of safe water and ensuring proper sanitation and hygiene, important strategies for the control of diarrheal diseases (depending on age) include breastfeeding, using oral rehydration solution, and, if diarrhea is moderate to severe, intravenous fluids, zinc supplementation, and immunization with rotavirus vaccine. Overall, rotavirus vaccine has been shown to be 30% effective against all-cause severe gastroenteritis, and 51%–93% protective against rotavirus gastroenteritis [14–16]. In addition to recommending rotavirus vaccine inclusion in national immunization

programs, for countries where diarrheal deaths account for $\geq 10\%$ of mortality among children aged < 5 years, WHO strongly recommends introduction of the vaccine. The prevalence in this refugee camp was twice that value; thus, evaluating rotavirus vaccine as a childhood vaccine in refugee camps will provide important information for its efficacy in this setting and potentially support attaining MDG4 goals.

Notes

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