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Editorial

Diarrhea: Rotavirus, Vaccines and Economics

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Acute diarrhea is a frequent cause of child hospitalization and outpatient visits in children under 5 years. Diarrhea claims nearly 9 million lives of children under the age of 5 years. Toll due to diarrhea is so high it is second largest death causing disease in pediatric age group. The developing world has more number of cases of diarrhea. This is due to lack of hygienic conditions, proper education, sanitary habits. This has been supported by improper health and nutritional status and lack of proper policies and support from governments. In spite of advances in medical, technology and other fields, large number of people does not have sanitation and health support. These people are deprived of proper sanitation and safe drinking water. This leads to increased incidence and prevalence of diarrhea [1].

Mortality from diarrhea has declined over the past two decades among children under five which parallels downward trends in overall under-five mortality. Despite these declines, diarrhea remains an important cause of death among children under five globally. Diarrhea and deaths due to it are more prevalent in Africa and South Asia. This is nearly 4/5 of deaths due to diarrhea worldwide. Just 15 countries account for almost three quarters of all deaths from diarrhea among children less than five years of age annually.

Diarrhea has wide range of etiology. This includes infections caused by various organisms including bacteria, viruses and protozoa. Though there are various strains of organisms cause diarrhea, very few lead to acute diarrheal breakouts [2]. Rotavirus is the leading cause of acute diarrhea, and is responsible for about 40 per cent of all hospital admissions due to diarrhea among children under five worldwide [3]. *E. coli, Shigella, Campylobacter, Salmonella, V. cholerae* are other common organisms causing epidemics. Faeco-oral is the most common mode of transmission.

Worldwide rotavirus is an important cause of diarrheal disease and deaths due to such diseases. This includes developed as well as third world countries [4,5]. Most cases of rotavirus gastroenteritis occur in children below 2 years of age. As far as developing countries are considered, rotavirus is important cause in first 2 years of life [6-8].

Seven groups of rotavirus have been identified (A to G) and group A (RV-A) is responsible for more than 90% of human rotavirus infections [9]. There are 60 serotypes of RV-A which is the commonest one and most common strains are: G1P, G2P, G3P, G4P and G9P [10]. Vaccination is the better measure to prevent rotavirus and its adoption has been recommended by World Health Organization [11]. An attenuated monovalent human RV-A and a pentavalent bovine-human reassortant are licensed worldwide.

US-FDA has approved two vaccines for the prevention of rotavirus gastroenteritis. The oral pentavalent vaccine, RotaTeq was approved as a three-dose series in February 2006, and the oral monovalent vaccine, Rotarix was approved as a two-dose series in April 2008. CDC recommends RV5 as routine vaccination at the age 2, 4 and 6 months of life [12].

In April 2009 the World Health Organization Strategic Advisory Group of Experts recommended that all national immunization programs include rotavirus vaccination for infants [13]. Globally a number of countries have adopted this recommendation, however, only a limited number of countries have done so. By the beginning of 2014, rotavirus vaccination had been implemented nationally in many European and Asian countries with vaccination coverage rates ranging from over 90% to less than 10% [14].

An important health benefit of vaccination comes from reaching high rotavirus mortality areas and the poorest house-holds. While vaccination coverage has increased over time, further coverage increases in these populations could substantially expand the impact of vaccination. More impact will be seen if the focus of healthcare provision is on regions with high mortality and less expenditure on healthcare.

The disease risk and healthcare access have their impact on health and economic status of the region respectively. It is found that less expenditure on healthcare leads to increased mortality. This has been observed in association with rotavirus where mortality is more in regions with less healthcare expenditure than their counterparts. In short poor healthcare access reflects as increased mortality. In addition, some of the same underlying factors such as geographic distance, lack of access to services, and low household economic resources, can contribute to increased risk and reduced healthcare utilization. There will always be inverse relationship between economic and healthcare burden in society. Healthcare provision and economics are always in inverse relationship with each other [15].

Cost effect analyses were performed for the rotavirus vaccines. Vaccination cost includes administration costs, the price of each dose, and expected losses from waste. Effect is calculated in terms of deaths and disability adjusted life years (DALY) [16]. It was observed that health burden was on lower income countries while economic burden was on upper middle income countries. Studies claim that vaccination can effectively reduce the tremendous health and economic burden of rotavirus gastroenteritis [17]. Overall societal effectiveness of vaccine depends upon the vaccine price and its reach to the children having very high risk of mortality due to diarrheal diseases.

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