ROTAVIRUS VACCINE INTRODUCTION

Children
Health

Vice-Chancellor Prof. Ernest Arteetey discusses Research Uptake at University of Ghana

One of the key purposes of the University of Ghana's (UG) research policy is to make available and accessible valuable research findings and results to targeted audiences. Research Uptake strategies are enhanced through the promotion of the University as a centre of excellence for research. As part of UG's Research Uptake strategy, four key research thematic areas will be pursued vigorously in the coming years. These are: malaria research; food production and processing; climate change adaptation and development policy; and poverty monitoring and evaluation. UG's commitment to Research Uptake is exemplified in the findings and results of the "Rotavirus Epidemiology and Vaccine introduction", which were presented at various meetings and seminars involving stakeholders.

DIARRHOEA IS A MAJOR DISEASE IN CHILDREN, AND WHILE ROTAVIRUSES HAVE BEEN IDENTIFIED AS AN IMPORTANT CAUSE OF DIARRHOEA WORLDWIDE, SUFFICIENT EVIDENCE WAS LACKING IN AFRICA.

Problem statement

Despite the fact that diarrhoea disease can be prevented and treated, it continues to be a major cause of morbidity and mortality in children under five years of age. Babies younger than one year carry the greatest risk (65.4%) of dying from diarrhoea.

The immediate cause of diarrhoea is often due to an infestation of an infectious material that includes viruses, parasites and bacteria. Recognised as the major cause of viral diarrhoea, rotaviruses have been responsible for 60% of all diarrhoea in children worldwide since 2008. In that time, rotaviruses have caused 452 000 deaths in children globally, with more than 90% – 420 000 – of these deaths occurring in Africa and Asia. Rotavirus vaccines have now been developed and are available for use as an intervention for diarrhoea caused by rotavirus infection.

Rationale for research

Although well established in the developed world, the significance of rotaviruses in diarrhoea in children continues to be grossly underestimated in Africa due to both a lack of expertise and the cost of diagnosis. Over the last two decades the overall objective of our research has been to provide much-needed evidence-based data to the Ministries of Health and Finance, as well as to policy-makers, to support the recognition of rotavirus as a significant cause of diarrhoea in children in Ghana and Africa. As it usually takes more than ten years for vaccines introduced in the developing world to get to African children, a further purpose of this data is to advocate for the decrease of introduction time of rotavirus vaccines in the Expanded Programme on Immunisation (EPI) in Africa, when these vaccines became available.

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The research thrust has been:

i) conducting epidemiological and burden of disease studies through the setting up of hospital-based rotavirus diarrhoea surveillance in hospitals in Ghana and other African countries;
ii) conducting efficacy studies on available rotavirus vaccines; and
iii) providing training and leadership on rotavirus diagnosis to other African countries, while advocating for the introduction of rotavirus vaccines in Ghana and Africa.

Methodology and activities

The initial activities to provide evidence regarding the important role played by rotaviruses in diarrhoea in Ghana started in earnest in 1991, with studies by electron microscopy to document rotavirus shedding in stools of diarrheic children admitted to the only children's hospital, the

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Princess Marie Louise Hospital, and the pediatric ward of the Korle Bu Teaching Hospital in Accra. This research was enhanced in 2001 with the setting up of an active and passive surveillance for rotavirus-associated diarrhoea in rural (Navrongo) and urban (Accra and Kumasi) Ghana, in order to generate baseline data on the epidemiology and seasonality of disease, associated symptoms including severity of diarrhoea, risk factors and particular strains circulating.

From 2009, these surveillance activities were enhanced by the setting up of burden-of-diseases studies in Ghana's two largest teaching hospitals to generate data on: the number of diarrhoea hospitalisations; the proportion of diarrhoea hospitalisations attributable to rotavirus; age-specific diarrhoea hospitalisations attributable to rotaviruses; and duration of hospitalisation for rotavirus-associated diarrhoea.

To help address the historical observation that, while rotavirus vaccines have shown good efficacy in developed countries, they have shown little or no efficacy in developing countries, we led a multi-site (Kenya, Mali, and Ghana) efficacy, safety and immunogenicity study on the rotavirus vaccine RotaTeq™ in Africa. In addition, from 2006 we held annual training workshops for African clinicians and technicians on rotavirus identification, diagnosis and strain characterisation, to help generate evidenced-based data for rotavirus vaccine advocacy activities across Africa.

> The efficacy studies showed that RotaTeq® significantly reduced severe RVGE in African children through the first two years of life and was immunogenic in African children.

Research output and policy implications

Surveillance studies in Ghana showed that more than 39% of children with diarrhoea were infected with rotaviruses, and that by 12 months of age 75% of infants had been infected with the virus, with the greatest window period of risk being 6 to 18 months of age. Studies from the African surveillance showed that more than 40% of children hospitalised with diarrhoea in Africa are infected with rotaviruses and multiple-strain Rotavirus Gastroenteritis (RVGE) circulating across Africa, with regional differences in strain predominance.

These results have helped to delineate the important role played by rotaviruses in diarrhoea in children and its large burden of disease. The study clearly demonstrated that rotavirus vaccination was a cost-effective intervention and provided the evidence-based data that the Ghana Ministries of Health and Finance needed to inform them on rotavirus disease burden, and helped them to make policy decisions on introducing rotavirus vaccines and including them in Ghana's EPI in June 2012. The research has also informed and influenced other countries in Africa and the developing world in their decisions on introducing rotavirus vaccines to their respective EPIs. Finally, our study has contributed to the anticipated prevention of more than 2 000 rotavirus-associated diarrhoea deaths and more than 100 000 hospitalisations in Ghanaian children annually.

Want to know more?

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Researcher
Prof. George Enyimah Armah
Senior Research Fellow EM/Histopathology Department
garmah@noguchi.mimcom.org; garmah@ug.edu.gh
(+233) 208 246 513
www.ug.edu.gh