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FOREWORD

The NICD rotavirus surveillance programme has been in operation at five sentinel hospitals since the introduction of the rotavirus vaccine in 2009. Interestingly, the 2012 rotavirus season lasted only 15 weeks, three weeks shorter than the 2011 season and nine weeks shorter than the 2009 pre-vaccine season. The effect of the vaccine on the burden of diarrhoea in South Africa to date is described in this issue. Vaccines are the primary subject of this issue, which includes an update of polio eradication in Africa as well as an evaluation of the immunogenicity of HIV booster vaccines containing gp140 protein with MF59 adjuvant in the HVTN 073E vaccine trial. Also in this issue, the risk of human infection of the H5N2 and H7N1 Avian Influenza strains in South Africa is assessed based on a recent sero-survey. As always, contributors are thanked for their inputs, which I trust you too will find useful and interesting.

Basil Brooke, Editor

CONTENTS

ROTAVIRUS SURVEILLANCE IN SOUTH AFRICA, 2012

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Introduction

Rotavirus causes acute gastroenteritis accompanied by vomiting, fever and abdominal pain. The icosahedral rotavirus particle consists of 3 layers (core, inner capsid and outer capsid) and encapsulates a genome of eleven distinct segments of double stranded RNA. The outer capsid is made up of VP7 and VP4 proteins, which are able to independently elicit an immune response and were important epitopes during vaccine development. These proteins specify the G and P genotypes respectively, and to date 27 G and 35 P genotypes have been described. In human infections, five globally predominant (G1, G2, G3, G4 and G9) and two regionally pre-

dominant (G8 and G12) G genotypes circulate. For the VP4 protein, two globally predominant (P[8] and P[4]) and one regionally predominant (P[6]) P genotype tend to be associated with rotavirus infections.

Rotavirus infection is the most common cause of hospitalization as a consequence of dehydrating diarrhoea in children under 5 years.[1] The incidence of diarrhoeal disease in South Africa is estimated at 111.8 per 1000 children under the age of 5 years.[2] Based on WHO recommendations, South Africa incorporated the rotavirus vaccine into its expanded immunization programme (EPI) in 2009. Prior to the introduction of the vaccine, the National Institute for Communicable Diseases (NICD) introduced a sentinel surveillance programme for rotavirus at five sentinel hospitals including: Chris Hani Baragwanath in Gauteng Province, Dr. George Mukhari in Gauteng (serving Gauteng and North West provinces), Mapulaneng and Matikwana in Mpumalanga Province and Edendale in Kwazulu-Natal.

The main objectives of this surveillance programme are to describe the epidemiology of rotavirus infection and to monitor the effect of the rotavirus vaccine on the incidence of disease following its introduction in South Africa.

Methods

Children under 5 years of age who were admitted to any of the sentinel hospitals with symptoms of three or more loose stools within a 24 hour period were enrolled into the surveillance programme following informed consent. Case investigation forms were completed by a surveillance officer on which pertinent descriptors including patient identifying information, demographic and socioeconomic information, clinical information and patient outcomes were captured. A stool sample was collected from each case for subsequent rotavirus testing.

Testing of stool samples collected in 2012 was performed at the Virology Division, Center for Enteric Diseases (CEDv), NICD, and at the Diarrhoeal Pathogens Research Unit (DPRU), University of Limpopo Medunsa Campus. The stool samples were screened with the ProSpecT™ Rotavirus Microplate Assay (Oxoid, Basingstoke, UK).

Rotavirus positive samples were further characterized to determine the G and P genotype of each strain. Rotavirus dsRNA was extracted from each stool sample using the QIAamp Viral RNA Mini kit (Qiagen, Hilden, Germany) and genotyped using standardized RT-PCR methods and primers for G-specific (G1, G2, G3, G4, G8, G9, G10, G12) and P-specific (P[4], P[6], P[8], P[9], P[10], P[11], P[14]) genotypes.[3]

Results

A total of 632 cases of diarrhoea was reported to the rotavirus surveillance programme during 2012. Of these, 598 stool samples were collected of which 118 (20%) tested positive for rotavirus. Comparable detection rates were recorded in 2010 and 2011 (21% for both years). The start of the 2012 rotavirus season began in week 23 and the highest detection rate (75%) was recorded in week 26 with 6 out of 8 specimens testing positive for rotavirus. There was a steep decline in cases in week 38, signaling the end of the rotavirus season (figure 1). The 2012 rotavirus season started later (2 weeks) and finished earlier (2 weeks) than the 2011 season (figure 2). The introduction of the vaccine did not affect the age distribution of rotavirus infections, but instead resulted in an overall decrease in rotavirus disease in all age groups (figure 3).

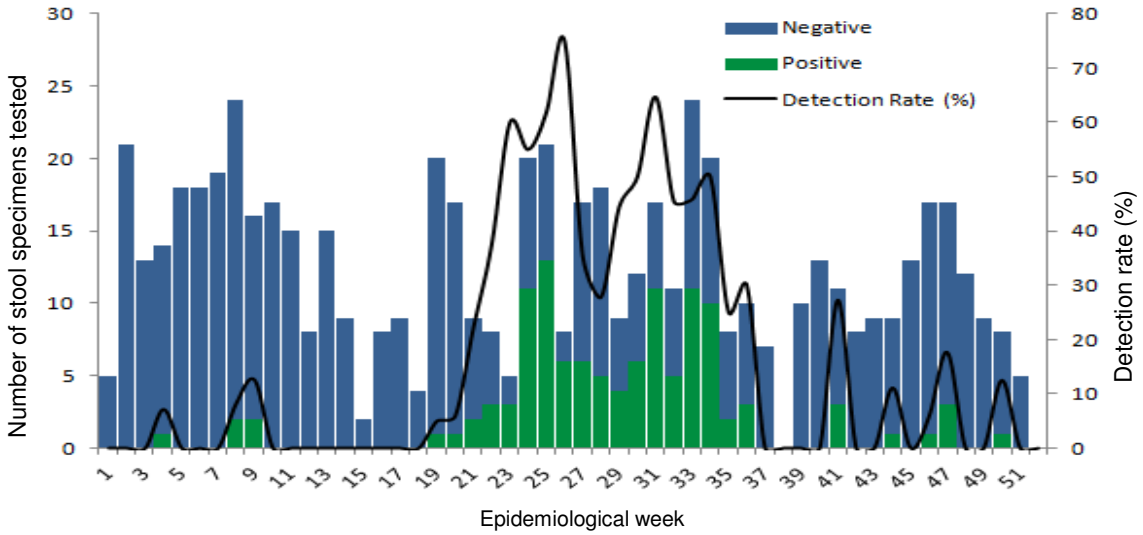

Figure 1: Number of stool samples tested and rotavirus detection rate (%) by week in children <5 years of age hospitalised for diarrhoea, South Africa, 2011.

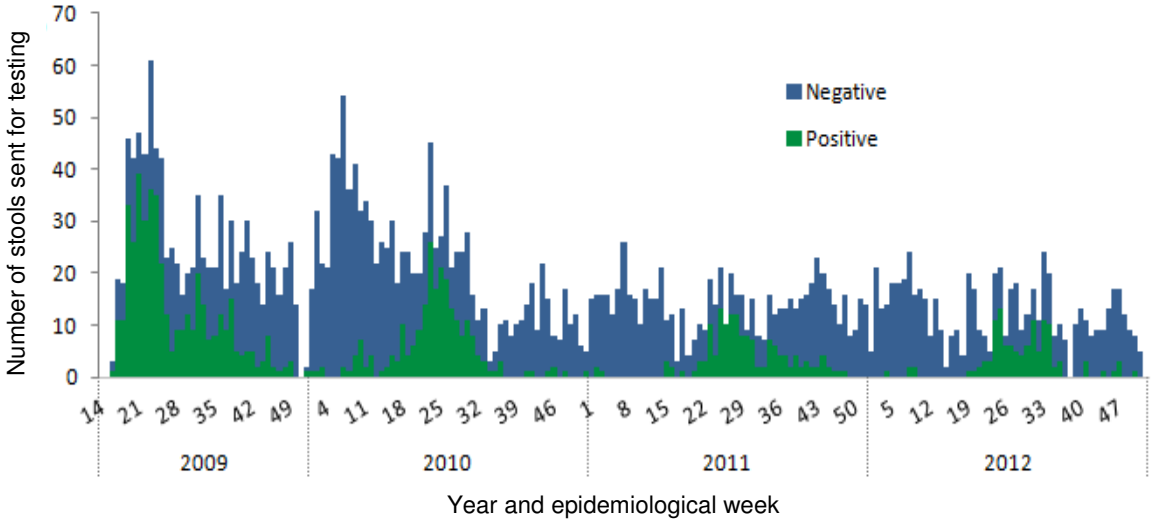

Figure 2: Number of rotavirus positive and negative stool samples tested by year for all sentinel surveillance sites, South Africa, 2009-2012.

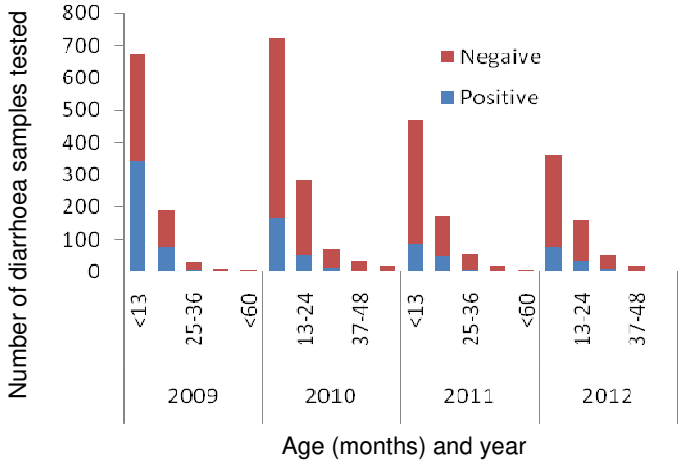

Figure 3: Age distribution of rotavirus positive and negative diarrhoea samples tested, South Africa, 2009-2012.

A total of 125 rotavirus strains was genotyped from the 2012 season to determine their G and P specificity. The results are summarized in table 1. For a second consecutive year, G12P[8] strains were predominant at all sentinel sites with G8P[4] common in the rural and coastal sites (Mapulaneng, Matikwana and Edendale) and the G2P[4] strains slightly more frequent in the Gauteng region (Chris Hani Baragwanath and Dr. George Mukhari).

Table 1. Summary of the G and P genotypes of rotavirus strains detected at sentinel hospitals in South Africa in 2012.

	CHBH		DGM		MP		MK		EdH		Total	
Genotype	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Rotavirus strains covered by the monovalent vaccine												
G1P[8]	1	3	0	0	1	6	0	0	0	0	2	2
G8P[8]	2	5	0	0	0	0	1	4	1	8	4	3
G12P[8]	11	28	18	56	4	25	16	64	5	38	54	43
G9P[8]	6	15	0	0	0	0	1	4	0	0	7	6
Total	20	51	18	56	5	31	18	72	6	46	67	54
Rotavirus strains not covered by the monovalent vaccine												
G2P[4]	7	18	6	19	1	6	2	8	0	0	16	13
G2P[6]	5	13	1	3	2	13	1	4	0	0	9	7
G3P[14]	1	3	0	0	0	0	0	0	0	0	1	1
G8P[4]	4	10	1	3	8	50	4	16	7	54	24	19
Total	17	44	8	25	11	69	7	28	7	54	50	40
Mixed and non-typeable rotavirus strains												
Mixed	0	0	4	13	0	0	0	0	0	0	4	3
Not yet typed	0	0	2	6	0	0	0	0	0	0	2	2
Negative	2	0	0	0	0	0	0	0	0	0	2	2
Total	2	5	6	19	0	0	0	0	0	0	8	6
Grand total	39		32		16		25		13		125	

CHBH = Chris Hani Baragwanath, DGM = Dr. George Mukhari, MP = Mapulaneng, MK = Matikwana, EdH = Edendale

Discussion

The proportion of diarrhoea cases positive for rotavirus has stabilized at 20 - 21% over the last 3 years following the introduction of rotavirus vaccine into the EPI schedule. The 2012 rotavirus season in South Africa started 2 weeks later than the 2011 season and 7 weeks later than the pre-vaccine 2009 season. The 2012 season lasted 15 weeks, three weeks shorter than the 2011 season which lasted 19 weeks and nine weeks shorter than the 2009 pre-vaccine season which lasted 24 weeks. The numbers of patient enrolments at sentinel hospitals have decreased substantially since 2010 with 1237 patients enrolled in 2010, 816 in 2011 and 632 in 2012. This represents an enrolment decrease of 51% between 2010 and 2012. Furthermore, despite the fact that 50% of the rotavirus strains detected are not present in the vaccine formulation, the total number of rotavirus infections recorded from the sentinel hospitals has dropped dramatically from 409 in 2009 to 238 in 2010, 151 in 2011 and 125 in 2012.

According to vaccine impact studies comparing pre-vaccination data (2008-2009) to post vaccination data (2010-2011) from the rotavirus surveillance system, there was a 54-58% reduction in the incidence of rotavi-

rus gastroenteritis in children under five years of age. Furthermore, the rotavirus vaccine resulted in an approximately 30% reduction in cases of severe (hospitalized) gastroenteritis in children less than 5 years of age.[4] This study, together with many other studies, has demonstrated the significant role that the rotavirus vaccine has played in reducing the burden of diarrhoea in South Africa.

Conclusion

The introduction of the rotavirus vaccine represents a significant public health achievement in South Africa. Ongoing surveillance is still required to track the epidemiology of rotavirus infection and to continue to monitor the effect of the introduction of the Rotarix® vaccine into the expanded programme on immunization.

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