

Rotavirus vaccine impact on hospitalizations due to rotavirus and all cause diarrhea among children <5 years of age in Sudan

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Background

Sudan introduced Rotarix, a monovalent rotavirus vaccine, nationally in 2011 to address the high morbidity and mortality due to rotavirus gastroenteritis in children. To assess Rotarix performance, the Federal Ministry of Health established 8 sentinel rotavirus surveillance sites at pediatric hospitals throughout the country before vaccine introduction. We examined the effect of Rotarix vaccination on the burden of rotavirus and acute gastroenteritis (AGE) hospitalizations in Sudan.

Methods

Four sentinel hospitals collected and tested stool specimens from 2009-2016. We calculated the change in the percentage of rotavirus-positive stools before (2009-2010) and after (2012-2016) rotavirus vaccine introduction among children <5 years of age. We also compared the annual proportion of all hospitalizations due to diarrhea and dehydration among children <5 years of age before (2003-2010) and after (2012-2016) rotavirus vaccine introduction using passive, national hospitalization data.

Results

Of the 5,727 AGE cases enrolled at sentinel sites in pre-vaccine years (2009-2010), all had stool specimens tested and 34% were positive for rotavirus. Of the 14,774 enrolled after introduction (2012-2016), 14,634 (99%) had stool specimens tested of which 29% were positive for rotavirus. By 2015 the declines in rotavirus-positives among children <5 years old were statistically significant at 3 of the 4 sites (Elobayed, Madani, and Gadarief: $p < 0.01$; Omdurman: $p = 0.8$) and the median percent reduction in the proportion of stools positive for rotavirus was 29% (range: 2, 44).

Using passive hospitalization data, by 2016 the proportion of all hospitalizations due to diarrhea and dehydration decreased by 35% for children <12 months of age and 15% among children 12-59 months of age compared to the pre-vaccine median ($p < 0.01$). These decreases began shortly after rotavirus vaccine introduction for children <12 months of age. No decline was observed among children 12-59 months old in the first 3 years after introduction compared to the pre-vaccine median.

Conclusions

These collective findings are suggestive of rotavirus vaccine impact on rotavirus-specific and all-cause AGE hospitalizations in Sudan. The reductions in rotavirus hospitalizations among older children at sentinel sites may also indicate potential herd immunity. Direct measures of vaccine performance such as vaccine effectiveness studies may help to better understand rotavirus vaccine performance in Sudan.