

Importance of Pre-Transplant Vaccination in Reducing Rotavirus Infection in Post-Transplant Patients

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ABSTRACT

Rotavirus is a highly contagious member of the Reoviridae family. It is the most common cause of diarrhea in the pediatric population. In this review, all the transplant pediatric patients admitted to our institute from January-May 2017 were reviewed. The inclusion criteria of our study included a chief complaint of diarrhea and a positive test for rotavirus with no confounding cause for the symptoms or for the admission. Based on the available data it can be concluded that administration of rotavirus vaccine in patients with intestinal failure prior to intestinal transplant can significantly decrease the incidence of rotavirus enteritis. Since the maximum recommended age for last dose of either vaccine is 32 weeks, therefore early vaccination as part of routine immunization is very important. This will improve the overall morbidity and mortality as well as the health-related financial burden on the hospital and economy.

Keywords: Rotavirus Infection, Rotavirus Vaccination, Transplant Patients, Economic Burden, Health Burden.

Introduction

Rotavirus is a highly contagious member of the Reoviridae family. It is the most common cause of diarrhea in the pediatric population [1]. Each year, rotavirus causes 125 million episodes of infectious diarrhea and 600,000 deaths in children less than 5 years of age worldwide [2]. Patients typically present with watery diarrhea accompanied by fever, vomiting and abdominal pain. Most of the time, the infection is self-limited and the management is conservative mainly focusing on optimizing hydration.

Patients with intestinal failure are at a significantly higher risk of acquiring rotavirus infection [3-5]. These patients fail to maintain fluids, electrolytes and energy requirements and therefore need sustained parenteral nutrition [3-5]. In addition, reports show 52% of children undergoing solid organ transplantation developed Rotavirus enteritis [6]. Transplant patients are particularly vulnerable to rotavirus infection given their immune-suppressed status. Hospital-acquired rotavirus infection remains a major public health concern in pediatric population [7]. These patients present with severe and occasionally fatal disease including the risk of transplant rejection from inadequate immunosuppressant levels as rotavirus enteritis affects the absorption and metabolism of immunosuppressant drugs necessary for the post-transplant patients [8]. This results in the need for intensive care, aggressive rehydration, and replacement of nutrients [8]. The cost of this aggressive treatment puts a significant burden on the healthcare system as well as the economy of the country that is potentially avoidable.

In recent years, increasing numbers of pediatric gastrointestinal patients at our institute have been found to have rotavirus infection. In this brief communication, authors highlight the economic burden an episode of rotavirus can have and the importance of rotavirus vaccines in reducing rotavirus episodes and hence the health-related economic burden.

Methods and Data

In this review, all the transplant pediatric patients admitted to our institute from January-May 2017 were reviewed. The inclusion criteria of our study included a chief complaint of diarrhea and a positive test for rotavirus with no confounding cause for the symptoms or for the admission.

A total of sixty-three patients were admitted during this time frame. Ten of these patients had diarrhea, of which three were found to be positive for rotavirus with no confounding other cause.

For these three patients, the length of hospital stay, number of laboratory and radiological investigations performed, and numbers of endoscopies performed were tabulated and relevant mean was calculated and summarized in Table 1.

The data gathered highlights health care burden due to this potentially preventable infection. It should be noted that our data does not include the hours of physician/nursing rounds or the additional medications administered to the patients.

Table 1: Summary of case details of Rotavirus-infected transplant patients.

	Patient 1	Patient 2	Patient 3	Mean
Age (months)	21	12	9	14
Sex	Male	Male	Female	
Cause of admission	Diarrhea and Fever	Diarrhea and Dehydration	Diarrhea, Fever and Cough	
Length of Hospital stay (days)	12	12	8	10.67
Total number of Laboratory investigations performed	82	163	131	125.33
Number of radiological investigations and procedures performed	1 (X-ray)	3 (CT-scan, Nuclear Medicine Study, Echocardiography)	1 (PICC line placement)	1.67
Number of endoscopies performed	1	None	None	0.33
Other procedures performed	None	1	1	
Complications /rejection developed	None	None	None	

Discussion

Prevention of Rotavirus infection: Although the consequences of rotavirus infection in immunosuppressed patients can be severe and costly, prevention of rotavirus is relatively simple and inexpensive. Preventive measures, including appropriate hand and general hygiene, can significantly reduce transmission of rotavirus. Rotavirus vaccines, available in monovalent and pentavalent forms, have been proven to be effective in reducing the number and severity of rotavirus enteritis and consequently the healthcare and economic burden [9-13]. According to Krishnarajah et al. the cost for first rotavirus episode and first diarrhea episode per 1000 persons was \$11,511 and \$46,772, respectively, lower for completely vaccinated children compared to unvaccinated children [14].

The rotavirus vaccine has also been associated with reduced morbidity and mortality in toddlers [15-16]. Given the fact that rotavirus can be contracted nosocomially, rotavirus vaccination plays an important role in reducing hospitalization leading to minimizing the risk of spreading of nosocomial infections, especially to immunosuppressed transplant patients. Keeping in view the utmost importance of rotavirus vaccines, World Health Organization (WHO) recommends inclusion of rotavirus vaccination in all national immunization programs [17]. Recommendations also include the administration of the first dose of either vaccine as early as 6-15 weeks of age and last dose should be administered not later than 32 weeks of age [17].

Efficacy and safety of Rotavirus vaccine in intestinal failure patients

A study conducted on 15 children, with a history of intestinal failure and consequently bowel surgery, investigated the

safety and immunogenicity of rotavirus vaccines. The study demonstrated overall positive outcomes [18]. These patients were followed-up for 6 months for complications and apart from minor complications, including fever, mild diarrhea, and emesis, the patients experienced no major complication (intussusception, viremia, dehydration).

In another study, when considering the safety and effectiveness of rotavirus vaccines in patients with functional short gut syndrome with an ileostomy, conducted on 9 children, it was found that the vaccine was well tolerated in majority of these patients [19].

Conclusion

Based on the available data it can be concluded that administration of rotavirus vaccine in patients with intestinal failure prior to intestinal transplant can significantly decrease the incidence of rotavirus enteritis. Since the maximum recommended age for last dose of either vaccine is 32 weeks, therefore early vaccination as part of routine immunization is very important. This will improve the overall morbidity and mortality as well as the health-related financial burden on the hospital and economy. Also previous studies were conducted on small population size; a multi-centered study should be conducted to better understand the impact of rotavirus vaccination in the prevention of rotavirus enteritis in post intestinal transplant patients.

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Financial or other Competing Interests: None.