

# Two-year experience with rotavirus vaccination in Estonia: changes in the epidemiology and etiology of acute gastroenteritis in hospitalised patients aged 0-18

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## Background

In Estonia rotavirus gastroenteritis (RVGE) has been the most common cause for hospitalisation among children aged <5 years during pre vaccine era. In July 2014 oral pentavalent bovine-derived rotavirus (RV) vaccine was implemented in the national immunization schedule. Due to national procurement it was replaced by monovalent RV vaccine in October 2015. Vaccination coverage of 65.6% and 86.8% was achieved by the end of 2015 and 2016 respectively.

## Aim

We aimed to demonstrate changes in the epidemiology and etiology of acute gastroenteritis (AGE) in hospitalised children over two-year period after the implementation of routine RV vaccination in Estonia.

## Methods

**Study design:** prospective observational study

**Study site:** 7 largest Estonian hospitals (~80% of pediatric hospitalisations in Estonia): West-Tallinn Central Hospital Centre for Infectious Diseases, Ida-Viru Hospital, Tartu University Hospital, Tallinn Children's Hospital, Pärnu Hospital, Kuressaare Hospital, and South-Estonian Hospital

**Study time:** 01.02.2015 to 31.08.2016

**Study population:** children aged 0-18 years hospitalised with AGE

**Recorded study data:** demographical data, disease severity according to Vesikari, Clark severity scales, WHO dehydration scale, clinical diagnosis based on viral antigen tests and bacterial stool cultures defined by the 10th revision of the International Classification of Diseases (ICD10)

## Results

- During study period 2260 subjects with AGE were hospitalised (Table 1). Although the median age of hospitalised AGE patients did not differ during study period an age shift was observed among hospitalised RVGE patients. In 2015 and 2016 RV seasons 18% and 14% of hospitalised RVGE cases were aged <18 months respectively, compared to 55% in the pre-vaccine era 2007-2008. (Figure 1)

### Abbreviations:

AGE- acute gastroenteritis, ADGE- adenovirus gastroenteritis, BGE- bacterial gastroenteritis, NGE- norovirus gastroenteritis, NIGE- non-infectious gastroenteritis, RV – rotavirus, RVGE- rotavirus gastroenteritis, UGE- unspecified gastroenteritis i.e ICD10 codes A09, A08.4

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Table 1. Characteristics of hospitalised AGE patients

Study period	01.02-31.12. 2015	01.01-31.08.2016
Hospitalised AGE Patients, N	1276	984
Age in years, median	2	2
Females, N (%)	596 (46%)	459 (46%)
Males, N (%)	680 (53%)	525 (53%)
Native speakers, N (%)	637 (50%)	462 (47%)
Vaccinated with RV vaccine, N (%)	231 (18%)	313 (32%)
Unknown vaccination status, N (%)	41 (3%)	50 (5%)
Time to hospitalisation median, days	1	1
Duration of hospitalisation median, days	3	3

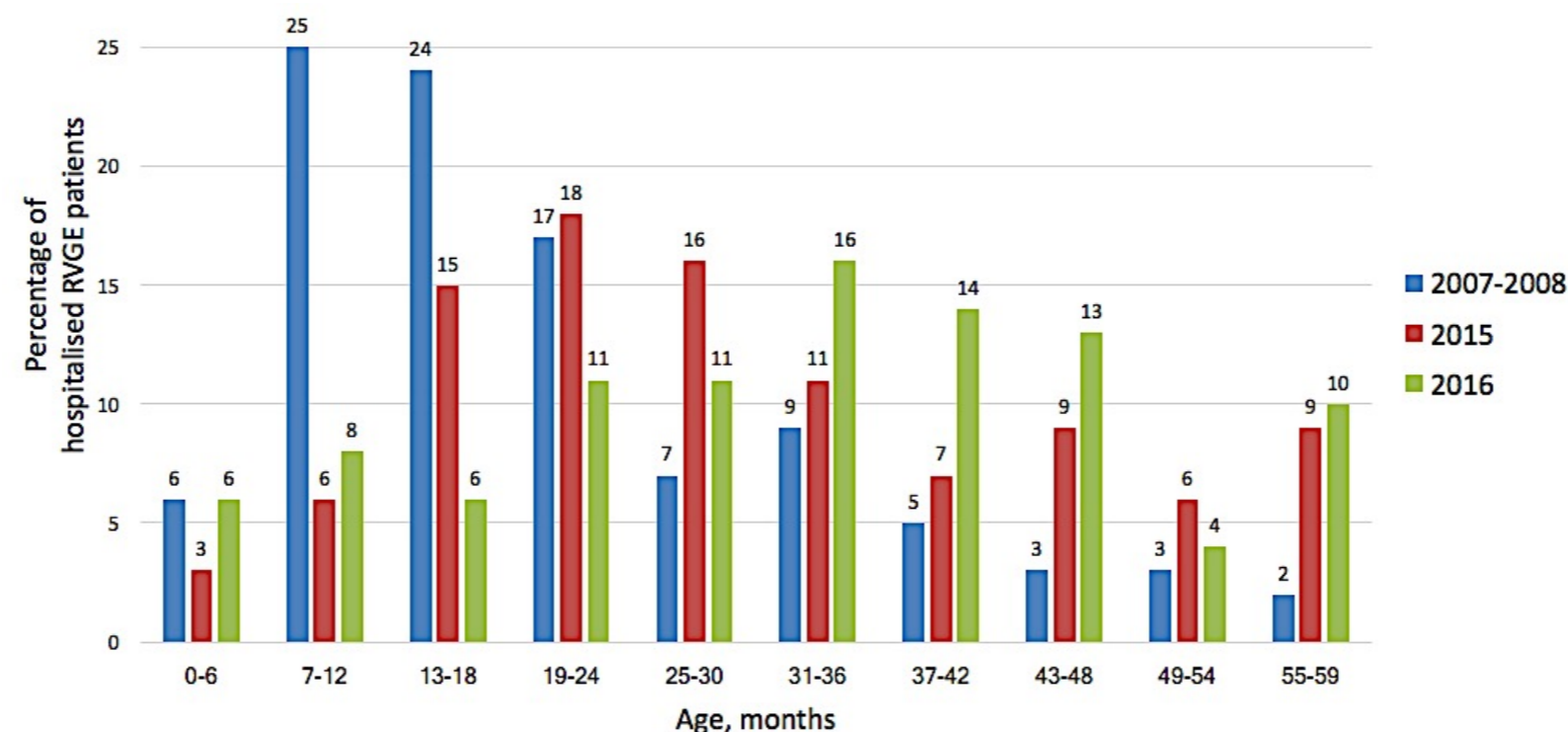


Figure 1. Age shift of hospitalised RVGE patients

- RV hospitalisation rate among children under the age of 5 dropped from 8-15 per 1000 population during prevaccine era to 5 and 1.4 per 1000 population in 2015 and 2016 RV seasons respectively. Non-RV AGE hospitalisation rate remained unchanged among all age groups with highest rate 12 per 1000 population persisting among children aged 0-11 months.

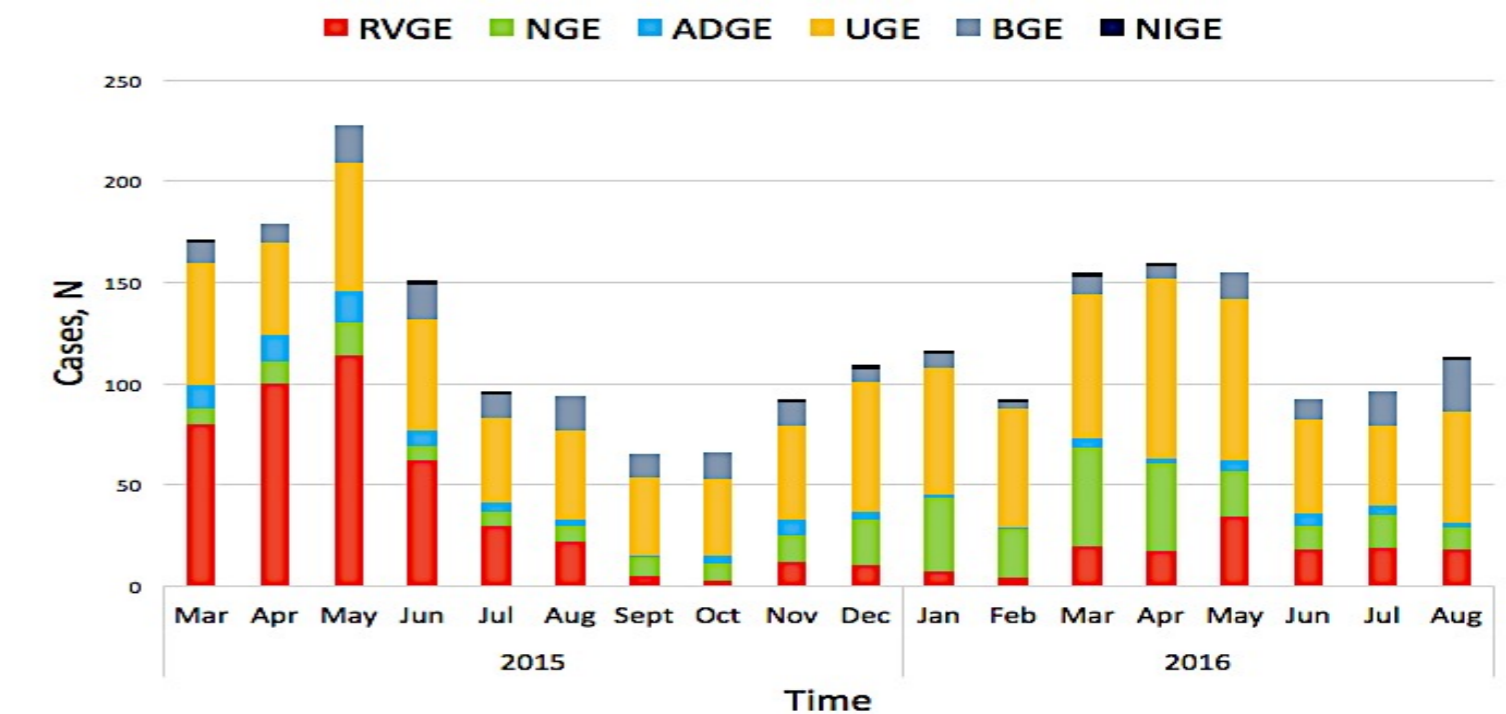


Figure 2. Etiology of hospitalised AGE in 2015-2016

- Vesikari, Clark severity scores and WHO dehydration scale demonstrated major differences in severity interpretation (data not shown), however compared to study done in Estonia during pre-vaccine era 2007-2008 using Clark severity scale slight shift towards less severe RV at hospitalisation was seen.

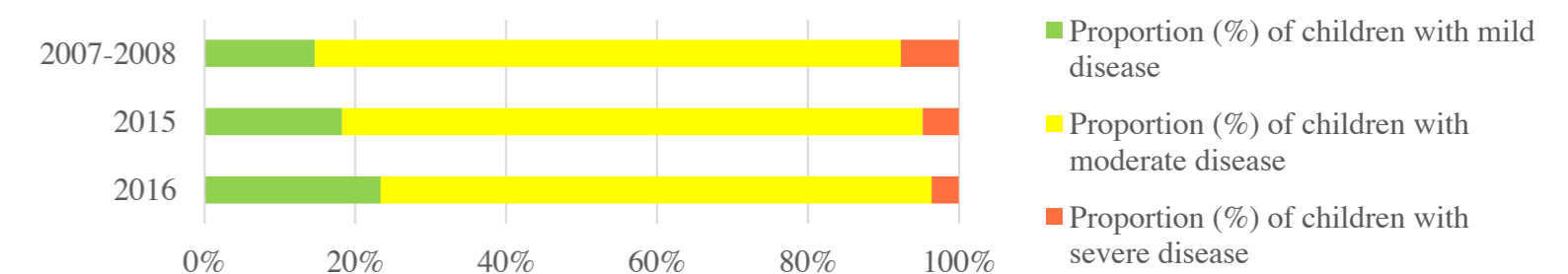


Figure 3. Hospitalised RVGE patients by Clark severity scale

## Conclusion

Within two years universal RV vaccination has led to remarkable decline of RVGE hospitalisations in Estonia among children under the age of 18, with highest reduction among vaccine eligible children. No decline in overall AGE hospitalisation rate was observed, mostly due to increase of NGE hospitalisations in 2016, possibly related to seasonal fluctuations.