SUBSTANTIAL COST OF PAEDIATRIC ROTAVIRUS GASTROENTERITIS (RVGE) IN 7 EUROPEAN COUNTRIES

Giaquinto C[1], Van Damme P[2], Huet F[3], Gothefors L[4], Van Der Wielen M[1], Trichard M[5], Largeron N[5]

[1] Department of Paediatrics, Padova University, Italy ; [2] Faculty of Medicine, Centre for the Evaluation of Vaccination, Antwerp University, Belgium ; [3] Service de Pédiatrie, CHU Dijon, France ; [4] Department of Clinical Sciences/Pediatrics, Umea University, Sweden ; [5] Sanofi Pasteur MSD, Lyon, France

BACKGROUND AND AIMS

- Rotavirus (RV) is the most common cause of gastroenteritis in young children in developing and industrialized countries.
- Rotavirus is highly contagious and easily transmitted mainly by the faecal-oral route. According to recent publications, paediatric rotavirus gastroenteritis (RVGE) is responsible for about half the cases of gastroenteritis.
- The symptoms of RVGE include diarrhoea, vomiting and fever, which can lead to severe dehydration and can result in death if rehydration therapy is not promptly initiated.
- Several European studies have assessed hospitalization and outpatient costs of RVGE. However, recent data on the total economic impact of RVGE in Europe is lacking.
- The objective of the study was to assess the average cost per RVGE episode in primary care, emergency room and hospital settings in children under 5 years - from both the national healthcare payer and societal perspectives - in the study areas in 7 European countries (France, Germany, Italy, Spain, Belgium, Spain, UK).

METHODS

- **Study design:**
  - One year (Sept. 2004 – Oct. 2005) observational, prospective, multicenter study of RVGE in children under 5 years old in areas of 7 European countries (France, Germany, Italy, Spain, Belgium, Spain, UK) called the REVEAL1 study (Rotavirus Gastroenteritis Epidemiology and Viral types in Europe Accounting for Losses in Public Health & Society)
- **Inclusion criteria:**
  - All children under 5 years seeking care in primary care (PC) (GP and/or paediatrician), emergency room (ER), or hospital for an episode of RVGE. If a child visited more than one healthcare setting, they were included at the highest level of care, in increasing order: primary care, emergency room, hospital.
  - AGE was defined as an episode within a 24-hour period of at least 3 loose or watery stools, or forceful vomiting associated with gastroenteritis in the 7 days before the medical visit; the episode must has been preceded by a symptom-free period of 14 days.
  - RVGE was defined as AGE with RV detected in a stool sample by enzyme-linked immunosorbent assay (ELISA).
- **Costs included:**
  - Direct medical costs: telephone consultation, consultation in outpatient settings (primary care office/home visit, emergency room/assessment ward visit) or inpatient care (hospitalisation), medication (prescribed and OTC), medical services (laboratory tests, diagnostic procedures).
  - Direct non medical costs: transportation, extra diapers and childcare.
  - Indirect costs: work days lost by parents and carers.
- **Cost analyses:**
  - Costs were assessed both from the national healthcare payer and societal perspectives by combining health care resource utilisation data collected from the REVEAL study and unit costs from official sources.

RESULTS

- The costs for 1102 children under 5 years with RVGE episodes were analysed *(table 1)*.

Table 1. *Observed number of children with confirmed RVGE by area and setting*

	Belgium (n = 57)	France (n = 99)	Germany (n = 158)	Italy (n = 336)	Spain (n = 252)	Sweden (n = 124)	UK (n = 76)
Hospital	39	30	53	55	52	69	39
Emergency Room	2	50	0[a]	148	101	54	22
Primary care	16	19	105	133	99	1b	15

[a] *In the German study area, all eligible children who presented to the emergency room with RVGE during the study were referred to hospital, so there were no inclusions for the emergency setting.*

[b] *In the primary care setting in the Swedish study area, parents generally called a nurse advice service located in the same medical centre as the primary care physicians. Therefore, following the nurses' advice, most children with AGE were referred to higher care or treated at home.*

- Total societal costs (including direct and indirect costs) per RVGE case ranged from €1525 to €2101 in the hospital setting, from €334 to €770 in the emergency setting and from €166 to €473 in the primary care setting depending on the country *(Table 2)*.
- The majority of hospital-related costs were reimbursed by healthcare payers, the percentage of reimbursed costs declined from the hospital setting to the emergency and primary care settings.

Table 2. *Total cost per RVGE case by area and setting*

Total cost per RVGE case (€)	Primary Care		Emergency Room		Hospital	
	Payer	Society	Payer	Society	Payer	Society
Belgium	23	476	*	*	1253	1546
France	34	321	80	334	1270	1525
Germany	110	432	**	--	1545	2085
Italy	22	292	202	599	1255	1901
Spain	17	166	204	409	1249	1552
Sweden	***	***	388	630	1830	2101
UK	57	375	476	770	1221	1938

Costs from the payer perspective included direct costs funded by the national health authorities.

Costs from the societal perspective included all costs (direct medical, direct nonmedical, and indirect costs), whether funded by the national health authorities, families or employers.

**ER data for Belgium are omitted because there were only 2 children with confirmed RVGE in the emergency setting.*

***In the German study area, all eligible children who presented to the emergency room with RVGE during the study were referred to hospital, so there were no inclusions for the emergency setting.*

**** Primary Care data for Sweden are omitted because there was only one child with confirmed RVGE in primary care.z*

- The mean number of work days lost by parents and other relatives to look after a sick child varied between countries and settings, ranging from 2.3 to 7.5 days and was higher in primary care setting; this represented the major cost in addition to the direct costs.

Table 3. *Proportion of parents who stopped working and mean number of work days lost by area and setting*

Work days lost	Primary Care		Emergency Room		Hospital	
	% parents	Duration	% parents	Duration	% parents	Duration
Belgium	64.3	4.8	50.0	4.00	39.3	4.2
France	42.1	3.4	44.0	2.5	43.3	2.3
Germany	36.4	5.3	-	-	53.1	6.4
Italy	44	3.7	64.4	3.8	81.1	5.4
Spain	31.9	4.1	44.1	4.4	68.2	4.6
Sweden	100.0	5.0	58.0	4.3	73.0	3.8
UK	20.0	7.5	50.0	2.9	90.9	4.0

CONCLUSION

- RVGE results in considerable resource utilisation in all healthcare settings and substantial costs for healthcare payers and society. Effective prevention of RVGE, through universal rotavirus immunisation of infants, could result in substantial savings for healthcare payers and society.
- The REVEAL cost study represents the most complete cost study of RVGE in Europe and provides comprehensive, up-to-date cost-of-illness data in three healthcare settings in seven European countries. These data could be used as input for cost-effectiveness studies and should prove useful to decision makers when evaluating the economic impact of introducing rotavirus vaccines

References:
1. Giaquinto et al. Costs of community-acquired paediatric rotavirus gastroenteritis in 7 European countries: the REVEAL study. J Infect Dis 2007;195 (suppl 1):S36–S44.