Vaccine xxx (2014) xxx–xxx

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Review

Economic and psychosocial Impact of rotavirus infection in Spain: A literature review

Javier Álvarez Aldeán[a], Javier Aristegui[b], Juan Luis López-Belmonte[c], Montse Pedrós[d,*], José García Sicilia[e]

[a] Hospital Costa del Sol, Marbella, Spain
[b] Hospital Universitario de Basurto, Bilbao, Spain
[c] Sanofi Pasteur MSD, Madrid, Spain
[d] IMS Health, Barcelona, Spain
[e] Hospital Universitario La Paz, Madrid, Spain

ARTICLE INFO

Article history:
Received 17 February 2014
Received in revised form 15 April 2014
Accepted 17 April 2014
Available online xxx

Keywords:
Gastroenteritis
Rotavirus
Economic impact
Psychosocial impact

ABSTRACT

Severe rotavirus gastroenteritis is common in children under 5 years of age. A literature review was performed to investigate the economic and psychosocial impact of rotavirus infection in children in this age group. We retrieved 56 articles on the economic burden of the disease in Europe, 18 of them reported data from Spain; 8 articles were retrieved analysing its psychosocial impact. In Spain, rotavirus is responsible for 14% to 30% of all cases of gastroenteritis, and a quarter of these require hospitalisation. It is also associated with high use of health care resources (emergency and primary care visits). Rotavirus gastroenteritis costs the Spanish national health system EUR 28 million a year and causes productivity loss in two-thirds of parents (mean of 4 days). Taking into account these costs, it was estimated that implementing universal vaccination could prevent 76% to 95% of hospital admissions due to rotavirus gastroenteritis, as well as reduce emergency and paediatric visits, nosocomial infections, and days missed from work (77% reduction). Rotavirus gastroenteritis also has a considerable psychosocial impact on the family, although it is difficult to compare results due to the diversity of study designs and the low specificity of the measurement tools used. It also causes high stress among parents, adding to their workload and adversely affecting their quality of life.

1. Introduction

Rotavirus is the leading cause of gastroenteritis in children, and is believed to be the most common cause of severe diarrhoea in children under 5 years of age worldwide [1]. The epidemiological burden of rotavirus infection is high in developed countries. In Spain, for instance, the estimated annual incidence of emergency department visits due to rotavirus gastroenteritis is 17 to 19 cases per 1000 children, while that of hospitalisations is 2.5 to 6.5 cases [2,3]. Rotavirus is also a major cause of nosocomial infection, with an estimated cumulative incidence of 7 cases per 100 hospitalised infants [2].

Rotavirus infection can be asymptomatic or result in gastroenteritis, which can cause severe dehydration and even shock in some cases. Treatment is symptomatic and consists of preventing dehydration.

In cases of severe dehydration, which particularly affects children under 2 years, parents may have difficulties ensuring adequate hydration. These difficulties – added to the burden of caring for a sick child – can cause considerable anxiety [4].

Rotavirus gastroenteritis has a major family and social impact, mostly related to productivity losses associated with parental absence from work. Furthermore, the high utilisation of health care resources associated with the disease places a considerable burden on national health care systems.

A literature search was undertaken to investigate the economic and psychosocial impact of rotavirus infection from the perspective of the health care system and society in Spain.

* Corresponding authors at: IMS, Health Economics and Outcomes Research, c/ Dr. Ferran, 25 27, 2nd floor, Barcelona, Spain. Tel.: +34 937496300.
E-mail addresses: diez_jav@gva.es (J.Á. Aldeán), lpalcacer@es.imshealth.com, Montse.Pedros@es.imshealth.com (M. Pedrós).

http://dx.doi.org/10.1016/j.vaccine.2014.04.058
0264-410X/

2. Methods

2.1. Economic impact

We performed a comprehensive literature review to identify publications reporting data on the burden and cost of rotavirus gastroenteritis in children under 5 years of age or the results of pharmacoeconomic analyses of the administration of available rotavirus vaccines. Using the Ovid platform, we searched the MEDLINE, Embase, Evidence-Based Medicine Reviews, and EconLit databases. We also searched the Spanish Medical Index (IME) database, the European Network of Health Economics Evaluation Databases (EURONHEED), and health technology assessment agencies databases in Spain's different autonomous communities. Finally, we performed a grey literature search. The data survey was conducted between October 28 and November 6, 2012.

Following the participants, interventions, comparators, outcomes, and study design (PICOS) model recommended in the PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses [5], the study population was defined as children under 5 years of age who had had an episode of acute rotavirus gastroenteritis for which they had been treated. Treatment was considered to include hygiene and dietary measures, oral rehydration, pharmacological treatment and hospitalisation, whether individually or in combination, or immunisation to prevent the infection. Comparators were not applicable, and outcomes were defined as any clinical result that involved the use of direct health care resources (hospitalisation, doctor visits, treatments, etc.), direct non-health care resources (transport, nappies, etc.), or indirect resources (productivity losses, income loss, etc.) by children with rotavirus infection and their families. We also considered studies that presented results from a pharmacoeconomic analysis of rotavirus vaccination in children.

The search terms used included "gastroenteritis", "rotavirus", "burden of illness", "health care resources", "cost", "health care costs", "non-medical health care expenses", "childcare cost", "expenses", "personal expenses", "productivity loss", "income loss", "cost-effectiveness", and "cost-analysis".

We included English- and Spanish-language original manuscripts and systematic reviews that reported data for European countries and that had been published in 2000 or later. We excluded conference proceedings, letters to the editor, editorials, book chapters, and case reports, as well as publications that did not report data on children, resource utilisation, or pharmacoeconomic analyses. Our findings for Spain and Europe are both presented to make their comparison more comprehensive.

2.2. Psychosocial impact

Our literature search was also designed to analyse the psychosocial impact of rotavirus gastroenteritis on children under 5 years of age and their families. The search method employed was identical to that used for the analysis of the economic impact of rotavirus infection. Examples of the search terms used are "gastroenteritis", "rotavirus", "quality of life", "stress", "depression", "anxiety", "fatigue", "sleep disturbance", "social problems", "disruption to activities of daily living", "family routine", "family relations", "social life", "domestic tasks", "psychosocial", and "family impact".

We included original manuscripts and systematic reviews published in English or Spanish between 1990 and the time of the search that reported data for Europe, the United States, Canada, and Australia. The exclusion criteria were the same as those described above.

The results are presented for all the analysed countries together due to the scarcity of papers retrieved.

2.3. Data extraction abstraction

For each of the articles selected, two reviewers independently extracted information on study and patient characteristics, study duration, outcome variables, main results, and conclusions, and recorded the results in a Windows Excel 2007 spreadsheet. The reviewers then compared their results and agreed on which information to extract from each article. The results were given to a group of four paediatricians, who, based on their experience with rotavirus in Spain, agreed on the final conclusions to be drawn for this review.

3. Results

3.1. Economic impact

The literature search retrieved 340 articles (Fig. 1), of which 56 were selected for full-text scrutiny. Of these, 5 were not considered to be relevant. Nineteen articles reported data for Spain (Table 1).

Of the 56 articles selected, 23 reported results from observational studies (12 retrospective, 9 prospective, and 2 cross-sectional). Seventeen articles presented results from a cost-effectiveness analysis of the implementation of a rotavirus vaccination programme. Of these, 4 analysed the situation in Spain.

The results indicate that 14% to 30% of hospital admissions due to acute gastroenteritis in children under 5 years of age in Spain are due to rotavirus [6,7] (Table 2). Approximately 25% of children with acute rotavirus gastroenteritis require hospitalisation [7], with a mean stay of 3 to 6 [8,9] days; hospitalisation is more common, and of a longer duration, in younger children [10,11]. Furthermore, it is estimated that medical care is not sought for 41% of all cases of rotavirus gastroenteritis, with children being cared for at home instead [12]. Rotavirus is also the main reason for one out of four visits due to acute gastroenteritis attending to primary care, representing 35.3% of all the acute gastroenteritis attended in emergency departments [13].

Based on data for Europe (Table 2), rotavirus is responsible for between 14% and 28% [6,14] of all hospital admissions due to acute gastroenteritis in children; the corresponding figures for children seen in primary care and emergency departments are 25% and 35%, respectively [13]. One third of parents of children with acute rotavirus gastroenteritis in Europe do not seek medical care [10,15].

With regards to the utilisation of resources by patients and their families, several studies have shown an increase in the use of nappies (an additional 5 per day) [16,17] regardless or not of whether the child has been hospitalised. Other resources mentioned are laboratory tests, intravenous or oral rehydration fluids, over-the-counter drugs, child care services, telephone calls to health care centres, and even time missed from day care centres [16,18,19].

The use of these resources is similar in Spain and other European countries.

The high use of direct health care resources places a considerable burden on health care providers, which in most cases, are the national health systems. In Spain, for example, acute rotavirus gastroenteritis costs the public health system approximately EUR 28 million each year [12,20], with hospitalisation accounting for the bulk of this cost. The cost of acute rotavirus gastroenteritis varies considerably in other European countries, with figures ranging from EUR 7.5 million a year in the Netherlands [21] and Greece [22] to EUR 63 million in France [23]. In Italy, the figure is similar to in Spain, at around EUR 28 million [20].

In Spain, the estimated cost of hospitalisation per episode of acute gastroenteritis ranges from EUR 1000 to EUR 1700 [10,11,16], although figures are higher for nosocomial infections due to the need for longer hospital stays. The estimated cost per episode in

Please cite this article in press as: Aldeán JÁ, et al. Economic and psychosocial Impact of rotavirus infection in Spain: A literature review. Vaccine (2014), http://dx.doi.org/10.1016/j.vaccine.2014.04.058