



Lost workdays and healthcare use before and after hospital visits due to rotavirus and other gastroenteritis among young children in Norway



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ABSTRACT

Background: Cost-effectiveness of rotavirus vaccination is affected by assumptions used in health economic evaluations. To inform such evaluations, we assessed healthcare use before and after hospitalisations due to rotavirus and other acute gastroenteritis (AGE) among children <5 years of age in Norway and estimated daycare and work absenteeism.

Methods: We conducted post-discharge interviews with caregivers of 282 children hospitalised with AGE at two hospitals in Norway during April 2014–February 2017. We collected data on healthcare use and absenteeism from daycare and work. We examined healthcare seeking and absenteeism patterns for RV-specific and other gastroenteritis.

Results: Caregivers of 485 (37%) of 1 298 hospitalised children were invited to participate, and 282 (58%) completed the questionnaire. Among these, 106 (38%) were rotavirus-positive, 119 (42%) were rotavirus-negative, and for 57 (20%) children no rotavirus testing was performed. Overall, 97% of children had been in contact with a healthcare provider before hospital admission and 28% had contacted a healthcare provider after discharge. Children that attended daycare were absent from daycare for a mean of 6.3 days (median 5 days). Caregivers of these children reported work absenteeism in 74% of cases. The mean duration of work absenteeism among caregivers was 5.9 days (median 5 days) both for RV-positive and RV-negative cases.

Conclusion: In Norway, work absenteeism and healthcare use before and after hospitalisation due to rotavirus and non-rotavirus gastroenteritis are considerable and impose an economic burden on the healthcare system and society.

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1. Introduction

Rotavirus (RV) is a primary cause of severe acute gastroenteritis (AGE) among young children worldwide [1]. As of 1 May 2016, 81 countries had introduced RV vaccination in national immunisation programmes [2], and in these countries, the RV disease burden has fallen considerably [1,3–5]. In non-vaccinated communities nearly all children experience at least one RV episode before five years of age [6]. In developed countries, deaths from RV are rare, but hospitalisation is often needed to treat severe cases [7].

RV vaccines have been available on the Norwegian market since 2006. In 2014, RV vaccination became a part of the national childhood immunisation programme and was offered to all children born on 1 September 2014 or later. Norway has an annual birth

cohort of approximately 60,000, and according to the Norwegian Immunisation Registry SYSVAK [8], 4822 children were vaccinated against RV between 2006 and 2014 before the RV vaccine became a part of the national immunisation programme. To monitor the impact of the vaccination programme, active surveillance of AGE among children less than five years of age was established at five hospitals from January 2014 [9]. As a part of this surveillance, post-discharge telephone interviews were conducted with caregivers of enrolled children at two of these hospitals to collect information about healthcare use, work absenteeism among caregivers and child absenteeism from daycare due to illness.

Until now, data on work loss due to caregiving of children with RV and non-RV AGE have not been available for the Norwegian setting. It is however known that productivity losses from work absenteeism are crucial for determining the cost-effectiveness of vaccination because they account for a substantial proportion of RV-associated economic burden [10–12]. Applying estimates from other countries to the Norwegian context is problematic due to

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differences in healthcare costs, sick leave policies, average wages, and childcare practices [13,14]. Direct healthcare costs of hospitalisations associated with RV-specific and other AGE in Norway have previously been studied using register-based data and the estimated economic burden was substantial [9,15]. However, our study is the first to assess costs incurring before and after hospital contacts by using active hospital surveillance data.

Hence, our purpose was to examine the healthcare resource use before and after hospital contacts among young children with RV gastroenteritis and other AGE treated in Norwegian hospitals. We also assessed child absenteeism from daycare and workdays lost among their caregivers. The results can inform health economic evaluations of RV and other gastroenteritis in children and cost-effectiveness studies of RV vaccination.

2. Methods

2.1. Study design

This was a prospective hospital-based surveillance study in children under five years of age admitted to hospital with AGE as inpatients or outpatients [9]. AGE was defined as diarrhoea (at least three loose stools in a 24-h period) or vomiting (at least one episode in 24 h). All children with a symptoms' duration of ≤ 10 days were actively enrolled in surveillance. Children transferred from another hospital after a hospital stay of >48 h were not enrolled to avoid inclusion of nosocomial gastroenteritis cases. Stool samples (bulk stool and/or rectal swabs) were obtained from enrolled cases within the first 48 h of admission, and clinical and demographic data were collected. Samples were tested for RV by an enzyme-linked immunosorbent assay and real-time polymerase-chain reaction in the national rotavirus reference laboratory. The severity of gastroenteritis was determined by using the 20-point Vesikari clinical scoring system [16]. The scoring system included seven severity indicators: duration of vomiting/diarrhoea, maximum number of episodes of vomiting/diarrhoea in 24 h, temperature, dehydration status, type of admission (inpatient/outpatient), and rehydration treatment provided to the child. To ascertain the true clinical severity, diarrhoea, vomiting, fever, and dehydration were measured at admission, because these parameters change after therapeutic interventions are initiated. The type of admission and rehydration treatment provided were recorded at discharge. Cases scoring less than 7 were classified as mild, cases scoring between 7 and 11 were classified as moderate, and cases scoring 11 or more were classified as severe.

Caregivers of children enrolled in hospital surveillance at two of five study hospitals were approached by telephone at least one week after discharge and invited to complete a study questionnaire. The questionnaire included questions about the frequency and type of contact made with healthcare providers before and after hospitalisation, child daycare attendance, child absenteeism from daycare, and caregiver absenteeism from work. Children were enrolled in hospital surveillance from January 2014 until February 2017, but post-discharge interviews were initiated in April 2014 after ethical approval was obtained. Thus, data for this part of the study were collected between April 2014 and February 2017. We verified rotavirus vaccination status among RV-positive children enrolled in the study by linking their unique personal ID number to the Norwegian Vaccination Registry SYSVAK [8]. To avoid selection bias, children with laboratory-confirmed rotavirus gastroenteritis that had received at least one dose of rotavirus vaccine ≥ 15 days prior to hospital admission were excluded. Vaccinated rotavirus-negative children were not excluded from the analysis. Two-sample t-tests were conducted to assess differences in healthcare use and absenteeism between RV-positive and RV-negative cases, and between inpatient and outpatient cases.

2.2. Study setting

The Norwegian healthcare system is comprised of primary care and specialist care services. Primary care includes general practitioner (GP) and emergency outpatient clinic (EOC) services, while hospital inpatient, outpatient, and ambulatory care are specialist services. Access to healthcare is universal, and the healthcare system is mainly public. The healthcare system is primarily financed through taxation and small user co-payments. Children under age 16 years are exempt from co-payments. An estimated 99% of the population is enrolled with a publicly funded GP [17], and outside GP opening hours patients typically seek care from physicians at EOC clinics. Primary care physicians are intended to act as gatekeepers to specialist care, so a referral from a primary care physician is necessary for hospital treatment unless the condition is urgent.

In Norway, parental leave following child birth is 49 weeks with a full salary compensation, or 59 weeks with an 80% salary compensation [18,19]. Employed parents of children 12 years of age or below are entitled to a paid childcare leave; parents with joint custody are entitled to 10 days of leave each per child in a calendar year, whereas single parents are entitled to 20 days per child. Parents of two or more children and parents of children with a chronic illness have a right to additional days. The only exception is self-employed persons (approximately 7% of the population [20]) whose rights for compensation depend on their insurance agreement.

3. Results

3.1. Sample overview

Of 1 298 children hospitalised with AGE at two study hospitals during April 2014–February 2017, 485 (37%) children were invited to participate in a post-discharge interview. Of these, caregivers of 282 (58%) children responded to the questionnaire. Caregiver responses for three children were excluded because the child was rotavirus-positive and had received RV vaccine prior to hospital admission. Thus, 279 children were included in the study, of which 37% ($n = 103$) were RV-positive, 43% ($n = 119$) were RV-negative (Table 1), and in 20% ($n = 57$) of cases no stool sample was available to conduct rotavirus testing. Overall, five (5%) of RV-positive and 13 (11%) of RV-negative cases were reported to have reduced resistance to infections due to congenital conditions (such as gastrointestinal tract anomalies), immunodeficiency, or other underlying conditions. In 75% ($n = 210$) of cases the mother

Table 1

Age, sex, type of hospital care, and Vesikari score among cases with RV-specific and other gastroenteritis.

		RV-positive n (%)	RV-negative n (%)
Total		103	119
Age	<1 year	19 (18%)	61 (51%)
	≥ 1 year	84 (82%)	58 (49%)
Sex	Female	44 (43%)	65 (56%)
	Male	58 (47%)	51 (44%)
	Missing	1	3
Hospital care	Inpatient	86 (83%)	63 (54%)
	Outpatient	17 (17%)	54 (46%)
	Missing	0	2
Gastroenteritis severity	Mild	2 (3%)	9 (10%)
	Moderate	17 (22%)	35 (40%)
	Severe	59 (76%)	43 (49%)
	Missing	25	32

Missing values are not included in the calculation of percentages.

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