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# Health-related quality of life of the parents of children hospitalized due to acute rotavirus infection: a cross-sectional study in Latvia

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## Abstract

**Background:** Rotavirus is the leading cause of severe diarrhea in young children and infants worldwide, representing a heavy public health burden. Limited information is available regarding the impact of rotavirus gastroenteritis on the quality of life of affected children and their families.

The objectives of study were to estimate the impact of rotavirus infection on health-related quality of life (HRQL), to assess the social and emotional effects on the families of affected children.

**Methods:** This study enrolled all ( $n = 527$ ) RotaStrip<sup>®</sup>-positive (with further PCR detection) cases (0–18 years of age) hospitalized from April 2013 to December 2015 and their caregivers. A questionnaire comprising clinical (filled-in by the medical staff) and social (filled by the caregivers) sections was completed per child.

**Results:** Main indicators of emotional burden reported by caregivers were compassion (reported as severe/very severe by 91.1% of parents), worry (85.2%), stress/anxiety (68.0%). Regarding social burden, 79.3% of caregivers reported the need to introduce changes into their daily routine due to rotavirus infection of their child. Regarding economic burden, 55.1% of parents needed to take days off work because of their child's sickness, and 76.1% of parents reported additional expenditures in the family's budget.

Objective measures of their child's health status were not associated with HRQL of the family, as were the parent's subjective evaluation of their child's health and some sociodemographic factors. Parents were significantly more worried if their child was tearful ( $p = 0.006$ ) or irritable ( $p < 0.001$ ). Parents were more stressful/anxious if their child had a fever ( $p = 0.003$ ), was tearful ( $p < 0.001$ ), or was irritable ( $p < 0.001$ ). Changes in parents' daily routines were more often reported if the child had a fever ( $p = 0.02$ ) or insufficient fluid intake ( $p = 0.04$ ).

**Conclusion:** Objective health status of the child did not influence the emotional, social or economic burden, whereas the parents' subjective perception of the child's health status and sociodemographic characteristics, were influential. A better understanding of how acute episodes affect the child and family, will help to ease parental fears and advise parents on the characteristics of rotavirus infection and the optimal care of an infected child.

**Keywords:** Rotavirus gastroenteritis, Health-related quality of life, Latvia, Childhood, Acute, Impact, Family

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## Background

Rotavirus is known to be the leading cause of severe gastroenteritis among infants and young children worldwide [1]. Rotavirus gastroenteritis is frequently associated with severe disease symptoms (vomiting, diarrhea, dehydration, etc.) and increased hospitalization episodes compared to other types of acute gastroenteritis caused by infectious agents [2].

Rotavirus gastroenteritis represents a heavy public health burden [3]. From 2010 to 2015, an average of 3000 registered rotavirus cases per year are reported in the age group of 0–6 years, being responsible for an average of approximately 1000 hospitalizations per year in Latvia [4].

The epidemiology of rotavirus gastroenteritis is well documented [5], but these data are not the only indicators of disease burden. Limited information is available regarding the impact of rotavirus gastroenteritis on the quality of life of affected children and their families [5].

Health-related quality of life (HRQL) refers to the subjective and objective impact of dysfunction associated with an illness or injury, medical treatment, and health care policy [6] and integrates physical, emotional and social well-being and functioning as perceived by the individual [7]. In pediatric research, HRQL measure has received an increasing attention and is recognized as a substantial health outcome [8]. Pediatric HRQL research is necessary to examine broader psychosocial outcomes and provide an in-depth understanding of the effects of disease and treatment on children's health status [9]. Nevertheless, this measure is primarily used in children with various chronic diseases [8].

In the case of pediatric disease, assessment of HRQL of the family is becoming increasingly important because a child's illness affects the whole family as a holistic system. Studies in this area provide information on family needs, responses to the child's disease, coping strategies and changes in family functioning. Most studies are related to childhood chronic diseases, such as congenital heart disease [7], bleeding disorders [10], atopic dermatitis [11], attention deficit/hyperactivity disorder [12], chronic kidney disease [13], and juvenile idiopathic arthritis [14], etc., in association with the quality of family life because of the long-term progression of such diseases and their impact on quality of life.

Less information is available regarding associations between temporary health conditions, such as acute rotavirus gastroenteritis, and HRQL. However, as childhood rotavirus gastroenteritis is a public health problem, it should be evaluated beyond clinical trials with respect to the psychological, social and economic consequences of the disease.

Studies that evaluated the effect of acute childhood rotavirus gastroenteritis on the family have revealed negative effects on family function and parental psycho-emotional

wellbeing [5, 15–17]. Parents indicated economic impact, such as lost work days lost due to the child's disease [5] and additional direct costs [17], disruption of schedules and restrictions on daily activities [15–17], high distress and worries due to symptoms [5, 15–17], exhaustion and helplessness [16], need for additional childcare and the use of more nappies [5].

The aim of this study was to estimate the impact of rotavirus infection on HRQL and to assess the social and emotional impacts on the families of affected children. In addition, the factors associated with HRQL characteristics will be clarified.

This article reports the family impact of rotavirus gastroenteritis requiring hospitalization of a child based on individual interviews with parents or legal caregivers and objective data from patient files.

## Methods

### Study design

To investigate the quality of life of families where child is suffering from acute rotavirus infection, a quantitative cross-sectional study was carried out among caregivers of children who had been hospitalized in the Children's Clinical University Hospital in Riga from April 2013 to December 2015.

### Inclusion and exclusion criteria

The study enrolled all hospital cases of rotavirus-positive children (0–18 years of age) and their caregivers (parents or legal family representatives). Caregivers had to be willing to participate and provide written consent. As exclusion criteria included the absence of caregivers or caregivers not providing signed consent.

### Data collection

Parents, of the laboratory confirmed rotavirus positive children, were invited to participate in individual interviews. The interviewer collected data regarding the clinical status of the child from patient files, and interviewed parents about emotional, social and economic factors pertaining to their child affecting their daily lives. All results and answers were collated in a questionnaire.

### Instruments used

A questionnaire was developed to estimate the impact of rotavirus infection on parents of affected children.

The questionnaire consisted of two general parts: clinical (filled-in by the medical staff) and social (filled by the caregivers) parts. The clinical part posed questions regarding the demographic data of the patient and family, and objective and subjective signs and symptoms to determine the clinical severity of the case. To categorize clinical severity, the Vesikari score [18] was used. The social part of the questionnaire was developed based on concepts and

research methods used in previous similar studies [5, 15–17] and covered the following domains of the impact of pediatric rotavirus on the family: 1) parental emotional wellbeing and feelings (distress; helplessness; mental exhaustion; worry; anxiety for the child; fear of being infected; feelings of guilt); 2) social burden of disease (or the disease impact on parents' daily activities (work schedule, training plans (syllabus), leisure time activities, domestic works (household)); 3) economic burden of the disease (working days lost due to child disease, additional financial expenditures); 4) parental opinion about the child's physical symptoms (diarrhea, vomiting, fever, abdominal pain, dehydration, loss of appetite) and changes in behavior (apathy, sleeping disorders, irritability, anxiety); 5) parental opinion about rotavirus vaccine use (awareness of vaccine existence (yes/no); use of vaccine (yes/no; if answered "no", the parents were asked about their motives for refusal).

Five-hundred twenty-seven hospitalized RotaStrip®-positive subjects further confirmed by PCR were enrolled in the study from April 2013 to December 2015. Totally 3301 hospitalized cases were registered from 2013 to 2015. As all enrolled patients were rotavirus-positive, the study did not have a rotavirus negative control group, but that can be considered in future research.

### Statistical analysis

Descriptive statistics such as means for continuous variables and proportions for categorical variables were calculated. To evaluate the statistical significance of the differences of proportions of severe/very severe cases between subgroups, a Chi-square test or Fisher's exact test were used. Statistical significance was set at  $p = 0.05$ .

Data processing was performed using IBM SPSS Statistics (Statistical Package for the Social Science, Version 22.0).

## Results

### Demographic characteristics of study subjects and their parents

The characteristics of the subjects and their parents are summarized in Table 1 (uploaded as separate file). The children's mean age was 26.1 months, and the sex ratio was balanced between male and female subjects. The majority of responding parents were in the 25–34 year-old age group. Collected data on education levels revealed that majority of mothers had a higher education; among fathers - persons with secondary/vocational education and a higher education were equally represented. Most respondents had a stable social status, and were living in urban areas. Low income citizens are defined by Cabinet of Ministers of Latvia by regulation No.299. It determines that citizens with total monthly income less than 128.06 EUR per family member, can obtain status of low income person, and may apply for social support. Others have stable social status [19].

**Table 1** Demographic and clinical characteristics of the study subjects and their parents ( $n = 527^a$ )

| Parameter                 | Number       | Percent |
|---------------------------|--------------|---------|
| Age of the child (months) |              |         |
| Mean (range)              | 26.1 (1–209) |         |
| ≤ 12                      | 156          | 29.7    |
| 13–24                     | 168          | 31.9    |
| 25–36                     | 89           | 16.9    |
| ≥ 37                      | 113          | 21.5    |
| Gender of the child       |              |         |
| Female                    | 258          | 49.0    |
| Male                      | 269          | 51.0    |
| Age of the mother (years) |              |         |
| ≤ 24                      | 55           | 10.5    |
| 25–34                     | 335          | 63.8    |
| 35–44                     | 127          | 24.2    |
| ≥ 45                      | 8            | 1.5     |
| Age of the father (years) |              |         |
| ≤ 24                      | 27           | 5.3     |
| 25–34                     | 281          | 55.1    |
| 35–44                     | 164          | 32.2    |
| ≥ 45                      | 38           | 7.5     |
| Education of mother       |              |         |
| Primary                   | 29           | 5.6     |
| Secondary/vocational      | 189          | 36.2    |
| Higher                    | 304          | 58.2    |
| Education of father       |              |         |
| Primary                   | 36           | 7.2     |
| Secondary/vocational      | 245          | 48.7    |
| Higher                    | 222          | 44.1    |
| Place of residence        |              |         |
| Urban                     | 449          | 87.2    |
| Rural                     | 66           | 12.8    |
| Social status             |              |         |
| Low-income                | 28           | 5.4     |
| Socially stable           | 491          | 94.6    |

<sup>a</sup>The sum of the stratified numbers can differ according to the parameters due to missing values

### Objective and subjective appraisal of child's health status

Clinical symptoms were categorized as severe according to the Vesikari score [18] in 93% patients ( $n = 463$ ) and moderate in 7% ( $n = 35$ ); no mild cases were detected. The objective and subjective appraisals of the health status of the included children are summarized in Table 2 (uploaded as separate file). Three symptoms most often notified by parents as very severe were diarrhea (mentioned by 53.6% ( $n = 280$ ) of parents), insufficient fluid intake (49.6%,  $n = 259$ ) and loss of appetite (41.5%,  $n = 215$ ).

**Table 2** Objective and subjective appraisal of the child's health status ( $n = 527^a$ )

| Parameter                                   | Number    | Percent |
|---------------------------------------------|-----------|---------|
| Maximal number of vomiting episodes per day |           |         |
| Mean (range)                                | 2.1 (0–3) |         |
| Number of diarrhea episodes per 24 h        |           |         |
| Mean (range)                                | 2.5 (1–3) |         |
| Severity (assessed by Vesikari score)       |           |         |
| Mild                                        | 0         | 0       |
| Moderate                                    | 35        | 7.0     |
| Severe                                      | 463       | 93.0    |
| Severity of symptoms (assessed by parent)   |           |         |
| Diarrhea                                    |           |         |
| Not at all                                  | 16        | 3.1     |
| Mild                                        | 17        | 3.3     |
| Moderate                                    | 77        | 14.8    |
| Severe                                      | 132       | 25.3    |
| Very severe                                 | 280       | 53.6    |
| Vomiting                                    |           |         |
| Not at all                                  | 82        | 15.7    |
| Mild                                        | 61        | 11.7    |
| Moderate                                    | 87        | 16.7    |
| Severe                                      | 111       | 21.3    |
| Very severe                                 | 181       | 34.7    |
| Fever                                       |           |         |
| Not at all                                  | 78        | 15.0    |
| Mild                                        | 65        | 12.5    |
| Moderate                                    | 110       | 21.2    |
| Severe                                      | 109       | 21.0    |
| Very severe                                 | 158       | 30.4    |
| Abdominal pain                              |           |         |
| Not at all                                  | 92        | 18.1    |
| Mild                                        | 71        | 14.0    |
| Moderate                                    | 135       | 26.6    |
| Severe                                      | 108       | 21.3    |
| Very severe                                 | 102       | 20.1    |
| Insufficient fluid intake                   |           |         |
| Not at all                                  | 40        | 7.7     |
| Mild                                        | 34        | 6.5     |
| Moderate                                    | 84        | 16.1    |
| Severe                                      | 105       | 20.1    |
| Very severe                                 | 259       | 49.6    |
| Loss of appetite                            |           |         |
| Not at all                                  | 45        | 8.7     |

**Table 2** Objective and subjective appraisal of the child's health status ( $n = 527^a$ ) (Continued)

| Parameter              | Number | Percent |
|------------------------|--------|---------|
| Mild                   | 44     | 8.5     |
| Moderate               | 106    | 20.1    |
| Severe                 | 108    | 20.5    |
| Very severe            | 215    | 41.5    |
| Apathy                 |        |         |
| Not at all             | 43     | 8.4     |
| Mild                   | 42     | 8.2     |
| Moderate               | 106    | 20.6    |
| Severe                 | 139    | 27.0    |
| Very severe            | 184    | 35.8    |
| Inflamed bottom        |        |         |
| Not at all             | 203    | 39.2    |
| Mild                   | 81     | 15.6    |
| Moderate               | 87     | 16.8    |
| Severe                 | 67     | 12.9    |
| Very severe            | 80     | 15.4    |
| Interrupted sleep mode |        |         |
| Not at all             | 167    | 32.2    |
| Mild                   | 94     | 18.1    |
| Moderate               | 121    | 23.3    |
| Severe                 | 82     | 15.8    |
| Very severe            | 55     | 10.6    |
| Tearfulness            |        |         |
| Not at all             | 78     | 15.0    |
| Mild                   | 75     | 14.4    |
| Moderate               | 153    | 29.4    |
| Severe                 | 131    | 25.2    |
| Very severe            | 83     | 16.0    |
| Anxiety, irritability  |        |         |
| Not at all             | 124    | 23.9    |
| Mild                   | 95     | 18.3    |
| Moderate               | 121    | 23.4    |
| Severe                 | 104    | 20.1    |
| Very severe            | 74     | 14.3    |

<sup>a</sup>The sum of the stratified numbers can differ according to the parameters due to missing values

### Assessment of emotional, social and economic impact of the disease on the family quality of life

Emotional, social, and economic impact of the disease is summarized in Table 3 (uploaded as separate file). Speaking about emotional burden of rotavirus infection - a very high level of compassion was found, mentioned as very severe in 76.4% ( $n = 402$ ) of questionnaires, followed by a very high level of worry in 59.6% ( $n = 311$ ) of cases and stress/anxiety (37.8% ( $n = 199$ ) of cases). Social burden was analyzed by

**Table 3** Assessment of emotional, social and economic impact of the disease on the family quality of life ( $n = 527^a$ )

| Parameter             | Number | Percent |
|-----------------------|--------|---------|
| Emotional burden      |        |         |
| Stress, anxiety       |        |         |
| Not at all            | 15     | 2.9     |
| Mild                  | 46     | 8.7     |
| Moderate              | 112    | 21.3    |
| Severe                | 154    | 29.3    |
| Very severe           | 199    | 37.8    |
| Helplessness, despair |        |         |
| Not at all            | 108    | 20.6    |
| Mild                  | 77     | 14.7    |
| Moderate              | 130    | 24.8    |
| Severe                | 95     | 18.1    |
| Very severe           | 114    | 21.8    |
| Exhaustion            |        |         |
| Not at all            | 55     | 10.5    |
| Mild                  | 62     | 11.8    |
| Moderate              | 149    | 28.4    |
| Severe                | 110    | 21.0    |
| Very severe           | 148    | 28.2    |
| Worry                 |        |         |
| Not at all            | 10     | 1.9     |
| Mild                  | 18     | 3.4     |
| Moderate              | 53     | 10.2    |
| Severe                | 130    | 24.9    |
| Very severe           | 311    | 59.6    |
| Compassion            |        |         |
| Not at all            | 8      | 1.5     |
| Mild                  | 4      | 0.8     |
| Moderate              | 30     | 5.7     |
| Severe                | 82     | 15.6    |
| Very severe           | 402    | 76.4    |
| Fear to get infected  |        |         |
| Not at all            | 265    | 50.4    |
| Mild                  | 91     | 17.3    |
| Moderate              | 75     | 14.3    |
| Severe                | 44     | 8.4     |
| Very severe           | 51     | 9.7     |
| Guilt                 |        |         |
| Not at all            | 199    | 38.0    |
| Mild                  | 82     | 15.6    |
| Moderate              | 94     | 17.9    |
| Severe                | 60     | 11.5    |
| Very severe           | 89     | 17.0    |

**Table 3** Assessment of emotional, social and economic impact of the disease on the family quality of life ( $n = 527^a$ ) (Continued)

| Parameter                | Number | Percent |
|--------------------------|--------|---------|
| Social burden            |        |         |
| Changes in daily routine |        |         |
| Yes                      | 413    | 79.0    |
| No                       | 110    | 21.0    |
| Economic burden          |        |         |
| Days off work            |        |         |
| None                     | 173    | 33.1    |
| 1–2                      | 117    | 22.4    |
| 3–4                      | 96     | 18.4    |
| 5+                       | 76     | 14.5    |
| Not employed             | 61     | 11.7    |
| Other expenditures       |        |         |
| Yes                      | 380    | 75.2    |
| No                       | 125    | 24.8    |

<sup>a</sup>The sum of the stratified numbers can differ according to the parameters due to missing values

changes in daily routines, and the analyzed data showed that 79.0% ( $n = 413$ ) of families had changes in their daily routine. Economic impact was analyzed by describing parental work day loss directly related to episodes of their child's illness. It revealed that only 33.1% ( $n = 173$ ) of parents did not need to take any days off work. Additionally - 75.2% ( $n = 380$ ) of respondents had extra expenditures due to the disease (symptomatic drugs, diapers, etc.).

#### Factors associated with the impact of the disease on the family quality of life

To evaluate the emotional burden of the disease, the three most common indicators of emotional burden were chosen for the further analysis, i.e., compassion, worry and stress/anxiety. To better perceive and interpret the data for further analysis the categories "severe" and "very severe" were combined, and the categories "mild" and "not at all" were combined.

In Table 4 (uploaded as separate file) the independent factors (sociodemographic, subjective and objective health status indicators) associated with the emotional burden of the disease are summarized.

None of the sociodemographic factors showed a significant association with the indicators of emotional burden of rotavirus infection. The only factor showing a significant association with compassion was education of the father, i.e., fathers with higher education corresponded to a higher proportion reporting high or very high levels of compassion ( $p = 0.01$ ).

None of the indicators of emotional burden showed a statistically significant association with the objective health status variables as well as with most of the subjective

**Table 4** Emotional burden (stress/anxiety, worry, compassion) of the disease stratified by the associated factors ( $n = 527^a$ )

| Factor                                           | Not at all / mild |      | Moderate |      | Severe / very severe |      | <i>p</i> |
|--------------------------------------------------|-------------------|------|----------|------|----------------------|------|----------|
|                                                  | Number            | %    | Number   | %    | Number               | %    |          |
| <b>STRESS / ANXIETY</b>                          |                   |      |          |      |                      |      |          |
| <i>Sociodemographic factors</i>                  |                   |      |          |      |                      |      |          |
| Gender                                           |                   |      |          |      |                      |      |          |
| Female                                           | 33                | 12.8 | 46       | 17.9 | 178                  | 69.3 | 0.16     |
| Male                                             | 28                | 10.4 | 66       | 24.5 | 175                  | 65.1 |          |
| Age                                              |                   |      |          |      |                      |      |          |
| ≤ 12 months                                      | 15                | 9.6  | 37       | 23.7 | 104                  | 66.7 | 0.24     |
| 13–24 months                                     | 16                | 9.5  | 34       | 20.2 | 118                  | 70.2 |          |
| 25–36 months                                     | 9                 | 10.2 | 21       | 23.9 | 58                   | 65.9 |          |
| 37+ months                                       | 21                | 18.6 | 20       | 17.7 | 72                   | 63.7 |          |
| Age of the mother                                |                   |      |          |      |                      |      |          |
| ≤ 24 years                                       | 5                 | 9.1  | 12       | 21.8 | 38                   | 69.1 | 0.78     |
| 25–34 years                                      | 35                | 10.4 | 73       | 21.8 | 227                  | 67.8 |          |
| 35–44 years                                      | 20                | 15.9 | 24       | 19.0 | 82                   | 65.1 |          |
| 45+ years                                        | 1                 | 12.5 | 2        | 25.0 | 5                    | 62.5 |          |
| Age of the father                                |                   |      |          |      |                      |      |          |
| ≤ 24 years                                       | 2                 | 7.4  | 7        | 25.9 | 18                   | 66.7 | 0.99     |
| 25–34 years                                      | 35                | 12.5 | 59       | 21.0 | 187                  | 65.5 |          |
| 35–44 years                                      | 19                | 11.6 | 35       | 21.3 | 110                  | 67.1 |          |
| 45+ years                                        | 4                 | 10.8 | 8        | 21.6 | 25                   | 67.6 |          |
| Education of the mother                          |                   |      |          |      |                      |      |          |
| Primary                                          | 4                 | 13.8 | 5        | 17.2 | 20                   | 69.0 | 0.95     |
| Secondary / vocational                           | 23                | 12.2 | 38       | 20.1 | 128                  | 67.7 |          |
| Higher                                           | 34                | 11.2 | 67       | 22.1 | 202                  | 66.7 |          |
| Education of the father                          |                   |      |          |      |                      |      |          |
| Primary                                          | 7                 | 19.4 | 6        | 16.7 | 23                   | 63.9 | 0.57     |
| Secondary / vocational                           | 25                | 10.2 | 55       | 22.5 | 164                  | 67.2 |          |
| Higher                                           | 28                | 12.6 | 47       | 21.2 | 147                  | 66.2 |          |
| Family structure                                 |                   |      |          |      |                      |      |          |
| Both parents                                     | 58                | 11.8 | 106      | 21.6 | 327                  | 66.6 | 0.20     |
| Single parent                                    | 1                 | 3.6  | 4        | 14.3 | 23                   | 82.1 |          |
| Place of residence                               |                   |      |          |      |                      |      |          |
| Urban                                            | 55                | 12.3 | 96       | 21.4 | 297                  | 66.3 | 0.74     |
| Rural                                            | 6                 | 9.1  | 14       | 21.2 | 46                   | 69.7 |          |
| <i>Objective evaluation of the health status</i> |                   |      |          |      |                      |      |          |
| Vomiting (times per 24 h)                        |                   |      |          |      |                      |      |          |
| 0                                                | 1                 | 33.3 | 0        | 0    | 2                    | 66.7 | 0.36     |
| 1                                                | 12                | 12.4 | 18       | 18.6 | 67                   | 69.1 |          |
| 2                                                | 28                | 12.4 | 58       | 25.7 | 140                  | 61.9 |          |
| 3                                                | 18                | 10.8 | 30       | 18.0 | 119                  | 71.3 |          |
| Diarrhea (times per 24 h)                        |                   |      |          |      |                      |      |          |
| 1                                                | 9                 | 14.3 | 12       | 19.0 | 42                   | 66.7 | 0.95     |

**Table 4** Emotional burden (stress/anxiety, worry, compassion) of the disease stratified by the associated factors ( $n = 527^a$ ) (Continued)

| Factor                                            | Not at all / mild |      | Moderate |      | Severe / very severe |      | <i>p</i> |
|---------------------------------------------------|-------------------|------|----------|------|----------------------|------|----------|
|                                                   | Number            | %    | Number   | %    | Number               | %    |          |
| 2                                                 | 13                | 10.6 | 27       | 22.0 | 83                   | 67.5 |          |
| 3                                                 | 37                | 11.9 | 68       | 21.8 | 207                  | 66.3 |          |
| Severity of episode (Vesikari)                    |                   |      |          |      |                      |      |          |
| Moderate                                          | 4                 | 11.4 | 6        | 17.1 | 25                   | 71.4 | 0.79     |
| Severe / very severe                              | 55                | 11.9 | 101      | 21.9 | 306                  | 66.2 |          |
| <i>Subjective evaluation of the health status</i> |                   |      |          |      |                      |      |          |
| Severity of diarrhea                              |                   |      |          |      |                      |      |          |
| Not at all / mild                                 | 5                 | 15.2 | 5        | 15.2 | 23                   | 69.7 | 0.41     |
| Moderate                                          | 13                | 17.1 | 17       | 22.4 | 46                   | 60.5 |          |
| Severe / very severe                              | 43                | 10.4 | 89       | 21.6 | 280                  | 68.0 |          |
| Severity of vomiting                              |                   |      |          |      |                      |      |          |
| Not at all / mild                                 | 15                | 10.5 | 35       | 24.5 | 93                   | 65.0 | 0.33     |
| Moderate                                          | 6                 | 6.9  | 21       | 24.1 | 60                   | 69.0 |          |
| Severe / very severe                              | 40                | 13.7 | 56       | 19.2 | 195                  | 67.0 |          |
| Severity of fever                                 |                   |      |          |      |                      |      |          |
| Not at all / mild                                 | 22                | 15.4 | 44       | 30.8 | 77                   | 53.8 | 0.003    |
| Moderate                                          | 10                | 9.2  | 22       | 20.2 | 77                   | 70.6 |          |
| Severe / very severe                              | 29                | 10.9 | 45       | 16.9 | 193                  | 72.3 |          |
| Severity of abdominal pain                        |                   |      |          |      |                      |      |          |
| Not at all / mild                                 | 24                | 14.7 | 34       | 20.9 | 105                  | 64.4 | 0.61     |
| Moderate                                          | 14                | 10.4 | 32       | 23.9 | 88                   | 65.7 |          |
| Severe / very severe                              | 21                | 10.0 | 44       | 21.0 | 145                  | 69.0 |          |
| Severity of insufficient fluid intake             |                   |      |          |      |                      |      |          |
| Not at all / mild                                 | 8                 | 10.8 | 16       | 21.6 | 50                   | 67.6 | 0.74     |
| Moderate                                          | 11                | 13.1 | 22       | 26.2 | 51                   | 60.7 |          |
| Severe / very severe                              | 42                | 11.6 | 73       | 20.1 | 248                  | 68.3 |          |
| Severity of loss of appetite                      |                   |      |          |      |                      |      |          |
| Not at all / mild                                 | 13                | 14.6 | 19       | 21.3 | 57                   | 64.0 | 0.07     |
| Moderate                                          | 9                 | 8.5  | 33       | 31.1 | 64                   | 60.4 |          |
| Severe / very severe                              | 39                | 12.1 | 59       | 18.3 | 224                  | 69.6 |          |
| Severity of apathy                                |                   |      |          |      |                      |      |          |
| Not at all / mild                                 | 7                 | 8.2  | 20       | 23.5 | 58                   | 68.2 | 0.37     |
| Moderate                                          | 17                | 16.0 | 25       | 23.6 | 64                   | 60.4 |          |
| Severe / very severe                              | 36                | 11.2 | 64       | 19.9 | 222                  | 68.9 |          |
| Severity of inflamed bottom                       |                   |      |          |      |                      |      |          |
| Not at all / mild                                 | 38                | 13.4 | 66       | 23.2 | 180                  | 63.4 | 0.35     |
| Moderate                                          | 10                | 11.6 | 14       | 16.3 | 62                   | 72.1 |          |
| Severe / very severe                              | 13                | 8.8  | 30       | 20.4 | 104                  | 70.7 |          |
| Severity of interrupted sleep mode                |                   |      |          |      |                      |      |          |
| Not at all / mild                                 | 36                | 13.8 | 54       | 20.8 | 170                  | 65.4 | 0.19     |

**Table 4** Emotional burden (stress/anxiety, worry, compassion) of the disease stratified by the associated factors ( $n = 527^a$ ) (Continued)

| Factor                             | Not at all / mild |      | Moderate |      | Severe / very severe |      | <i>p</i> |
|------------------------------------|-------------------|------|----------|------|----------------------|------|----------|
|                                    | Number            | %    | Number   | %    | Number               | %    |          |
| Moderate                           | 14                | 11.6 | 32       | 26.4 | 75                   | 62.0 |          |
| Severe / very severe               | 11                | 8.0  | 25       | 18.2 | 101                  | 73.7 |          |
| Severity of tearfulness            |                   |      |          |      |                      |      |          |
| Not at all / mild                  | 35                | 22.9 | 30       | 19.6 | 88                   | 57.5 | < 0.001  |
| Moderate                           | 12                | 7.9  | 43       | 28.3 | 97                   | 63.8 |          |
| Severe / very severe               | 14                | 6.5  | 39       | 18.2 | 161                  | 75.2 |          |
| Severity of anxiety / irritability |                   |      |          |      |                      |      |          |
| Not at all / mild                  | 44                | 20.2 | 47       | 21.6 | 127                  | 58.3 | < 0.001  |
| Moderate                           | 9                 | 7.4  | 36       | 29.8 | 76                   | 62.8 |          |
| Severe / very severe               | 8                 | 4.5  | 27       | 15.2 | 143                  | 80.3 |          |
| WORRY                              |                   |      |          |      |                      |      |          |
| <i>Sociodemographic factors</i>    |                   |      |          |      |                      |      |          |
| Gender                             |                   |      |          |      |                      |      |          |
| Female                             | 12                | 4.7  | 20       | 7.8  | 224                  | 87.5 | 0.16     |
| Male                               | 16                | 6.0  | 33       | 12.4 | 217                  | 81.6 |          |
| Age                                |                   |      |          |      |                      |      |          |
| ≤ 12 months                        | 6                 | 3.9  | 16       | 10.4 | 132                  | 85.7 | 0.12     |
| 13–24 months                       | 6                 | 3.6  | 15       | 8.9  | 147                  | 87.5 |          |
| 25–36 months                       | 5                 | 5.7  | 6        | 6.9  | 76                   | 87.4 |          |
| 37+ months                         | 11                | 9.8  | 16       | 14.3 | 85                   | 75.9 |          |
| Age of mother                      |                   |      |          |      |                      |      |          |
| ≤ 24 years                         | 4                 | 7.3  | 1        | 1.8  | 50                   | 90.9 | 0.21     |
| 25–34 years                        | 15                | 4.5  | 35       | 10.5 | 283                  | 85.0 |          |
| 35–44 years                        | 9                 | 7.3  | 14       | 11.3 | 101                  | 81.5 |          |
| 45+ years                          | 0                 | 0    | 2        | 25.0 | 6                    | 75.0 |          |
| Age of father                      |                   |      |          |      |                      |      |          |
| ≤ 24 years                         | 1                 | 3.7  | 1        | 3.7  | 25                   | 92.6 | 0.81     |
| 25–34 years                        | 15                | 5.4  | 27       | 9.6  | 238                  | 85.0 |          |
| 35–44 years                        | 9                 | 5.6  | 18       | 11.1 | 135                  | 83.3 |          |
| 45+ years                          | 1                 | 2.8  | 5        | 13.9 | 30                   | 83.3 |          |
| Education of mother                |                   |      |          |      |                      |      |          |
| Primary                            | 0                 | 0    | 2        | 6.9  | 27                   | 93.1 | 0.58     |
| Secondary / vocational             | 11                | 5.9  | 16       | 8.6  | 159                  | 85.5 |          |
| Higher                             | 17                | 5.6  | 33       | 10.9 | 252                  | 83.4 |          |
| Education of father                |                   |      |          |      |                      |      |          |
| Primary                            | 3                 | 8.3  | 0        | 0    | 33                   | 91.7 | 0.30     |
| Secondary / vocational             | 12                | 5.0  | 26       | 10.8 | 203                  | 84.2 |          |
| Higher                             | 11                | 5.0  | 24       | 10.9 | 186                  | 84.2 |          |
| Family structure                   |                   |      |          |      |                      |      |          |
| Both parents                       | 26                | 5.3  | 49       | 10.0 | 413                  | 84.6 | 0.92     |
| Single parent                      | 1                 | 3.6  | 3        | 10.7 | 24                   | 85.7 |          |
| Place of residence                 |                   |      |          |      |                      |      |          |



**Table 4** Emotional burden (stress/anxiety, worry, compassion) of the disease stratified by the associated factors ( $n = 527^a$ ) (Continued)

| Factor                                            | Not at all / mild |      | Moderate |      | Severe / very severe |      | $p$  |
|---------------------------------------------------|-------------------|------|----------|------|----------------------|------|------|
|                                                   | Number            | %    | Number   | %    | Number               | %    |      |
| Urban                                             | 25                | 5.6  | 48       | 10.8 | 372                  | 83.6 | 0.27 |
| Rural                                             | 3                 | 4.6  | 3        | 4.6  | 59                   | 90.8 |      |
| <i>Objective evaluation of the health status</i>  |                   |      |          |      |                      |      |      |
| Vomiting (times per 24 h)                         |                   |      |          |      |                      |      |      |
| 0                                                 | 1                 | 33.3 | 0        | 0    | 2                    | 66.7 | 0.21 |
| 1                                                 | 6                 | 6.3  | 6        | 6.3  | 84                   | 87.5 |      |
| 2                                                 | 11                | 4.9  | 26       | 11.6 | 187                  | 83.5 |      |
| 3                                                 | 6                 | 3.6  | 19       | 11.4 | 141                  | 84.9 |      |
| Diarrhea (times per 24 h)                         |                   |      |          |      |                      |      |      |
| 1                                                 | 6                 | 9.5  | 3        | 4.8  | 54                   | 85.7 | 0.13 |
| 2                                                 | 5                 | 4.1  | 10       | 8.1  | 108                  | 87.8 |      |
| 3                                                 | 13                | 4.2  | 38       | 12.3 | 257                  | 83.4 |      |
| Severity of episode (Vesikari)                    |                   |      |          |      |                      |      |      |
| Moderate                                          | 2                 | 5.7  | 2        | 5.7  | 31                   | 88.6 | 0.64 |
| Severe / very severe                              | 22                | 4.8  | 49       | 10.7 | 387                  | 84.5 |      |
| <i>Subjective evaluation of the health status</i> |                   |      |          |      |                      |      |      |
| Severity of diarrhea                              |                   |      |          |      |                      |      |      |
| Not at all / mild                                 | 2                 | 6.1  | 5        | 15.2 | 26                   | 78.8 | 0.07 |
| Moderate                                          | 9                 | 11.8 | 6        | 7.9  | 61                   | 80.3 |      |
| Severe / very severe                              | 17                | 4.2  | 41       | 10.0 | 350                  | 85.8 |      |
| Severity of vomiting                              |                   |      |          |      |                      |      |      |
| Not at all / mild                                 | 7                 | 4.9  | 13       | 9.2  | 122                  | 85.9 | 0.09 |
| Moderate                                          | 1                 | 1.1  | 14       | 16.1 | 72                   | 82.8 |      |
| Severe / very severe                              | 20                | 6.9  | 25       | 8.7  | 243                  | 84.4 |      |
| Severity of fever                                 |                   |      |          |      |                      |      |      |
| Not at all / mild                                 | 11                | 7.8  | 13       | 9.2  | 117                  | 83.0 | 0.14 |
| Moderate                                          | 5                 | 4.6  | 17       | 15.7 | 86                   | 79.6 |      |
| Severe / very severe                              | 12                | 4.5  | 22       | 8.3  | 232                  | 87.2 |      |
| Severity of abdominal pain                        |                   |      |          |      |                      |      |      |
| Not at all / mild                                 | 13                | 8.0  | 18       | 11.0 | 132                  | 81.0 | 0.34 |
| Moderate                                          | 8                 | 6.1  | 14       | 10.7 | 109                  | 83.2 |      |
| Severe / very severe                              | 7                 | 3.3  | 19       | 9.1  | 183                  | 87.6 |      |
| Severity of insufficient fluid intake             |                   |      |          |      |                      |      |      |
| Not at all / mild                                 | 5                 | 6.8  | 6        | 8.1  | 63                   | 85.1 | 0.89 |
| Moderate                                          | 3                 | 3.6  | 9        | 10.7 | 72                   | 85.7 |      |
| Severe / very severe                              | 20                | 5.6  | 37       | 10.3 | 302                  | 84.1 |      |
| Severity of loss of appetite                      |                   |      |          |      |                      |      |      |
| Not at all / mild                                 | 5                 | 5.6  | 9        | 10.1 | 75                   | 84.3 | 0.57 |
| Moderate                                          | 3                 | 2.9  | 14       | 13.5 | 87                   | 83.7 |      |
| Severe / very severe                              | 19                | 5.9  | 29       | 9.0  | 273                  | 85.0 |      |

**Table 4** Emotional burden (stress/anxiety, worry, compassion) of the disease stratified by the associated factors ( $n = 527^a$ ) (Continued)

| Factor                             | Not at all / mild |      | Moderate |      | Severe / very severe |      | $p$     |
|------------------------------------|-------------------|------|----------|------|----------------------|------|---------|
|                                    | Number            | %    | Number   | %    | Number               | %    |         |
| Severity of apathy                 |                   |      |          |      |                      |      |         |
| Not at all / mild                  | 1                 | 1.2  | 12       | 14.3 | 71                   | 84.5 | 0.24    |
| Moderate                           | 7                 | 6.6  | 12       | 11.3 | 87                   | 82.1 |         |
| Severe / very severe               | 19                | 5.9  | 28       | 8.8  | 273                  | 85.3 |         |
| Severity of inflamed bottom        |                   |      |          |      |                      |      |         |
| Not at all / mild                  | 20                | 7.1  | 34       | 12.0 | 229                  | 80.9 | 0.13    |
| Moderate                           | 4                 | 4.7  | 5        | 5.8  | 77                   | 89.5 |         |
| Severe / very severe               | 4                 | 2.8  | 13       | 9.0  | 128                  | 88.3 |         |
| Severity of interrupted sleep mode |                   |      |          |      |                      |      |         |
| Not at all / mild                  | 19                | 7.4  | 26       | 10.1 | 213                  | 82.6 | 0.33    |
| Moderate                           | 5                 | 4.2  | 14       | 11.7 | 101                  | 84.2 |         |
| Severe / very severe               | 4                 | 2.9  | 12       | 8.8  | 121                  | 88.3 |         |
| Severity of tearfulness            |                   |      |          |      |                      |      |         |
| Not at all / mild                  | 16                | 10.5 | 19       | 12.5 | 117                  | 77.0 | 0.006   |
| Moderate                           | 6                 | 4.0  | 16       | 10.6 | 129                  | 85.4 |         |
| Severe / very severe               | 6                 | 2.8  | 16       | 7.5  | 191                  | 89.7 |         |
| Severity of anxiety / irritability |                   |      |          |      |                      |      |         |
| Not at all / mild                  | 21                | 9.7  | 26       | 12.0 | 170                  | 78.3 | < 0.001 |
| Moderate                           | 2                 | 1.7  | 19       | 15.8 | 99                   | 82.5 |         |
| Severe / very severe               | 5                 | 2.8  | 7        | 4.0  | 165                  | 93.2 |         |
| COMPASSION                         |                   |      |          |      |                      |      |         |
| <i>Sociodemographic factors</i>    |                   |      |          |      |                      |      |         |
| Gender                             |                   |      |          |      |                      |      |         |
| Female                             | 3                 | 1.2  | 15       | 5.8  | 239                  | 93.0 | 0.25    |
| Male                               | 9                 | 3.3  | 15       | 5.6  | 245                  | 91.1 |         |
| Age                                |                   |      |          |      |                      |      |         |
| ≤ 12 months                        | 3                 | 1.9  | 4        | 2.6  | 149                  | 95.5 | 0.21    |
| 13–24 months                       | 6                 | 3.6  | 9        | 5.4  | 153                  | 91.1 |         |
| 25–36 months                       | 1                 | 1.1  | 6        | 6.8  | 81                   | 92.0 |         |
| 37+ months                         | 2                 | 1.8  | 11       | 9.7  | 100                  | 88.5 |         |
| Age of mother                      |                   |      |          |      |                      |      |         |
| ≤ 24 years                         | 1                 | 1.8  | 1        | 1.8  | 53                   | 96.4 | 0.68    |
| 25–34 years                        | 8                 | 2.4  | 17       | 5.1  | 310                  | 92.5 |         |
| 35–44 years                        | 3                 | 2.4  | 10       | 7.9  | 113                  | 89.7 |         |
| 45+ years                          | 0                 | 0    | 1        | 12.5 | 7                    | 87.5 |         |
| Age of father                      |                   |      |          |      |                      |      |         |
| ≤ 24 years                         | 0                 | 0    | 1        | 3.7  | 26                   | 96.3 | 0.43    |
| 25–34 years                        | 7                 | 2.5  | 11       | 3.9  | 263                  | 93.6 |         |
| 35–44 years                        | 5                 | 3.0  | 11       | 6.7  | 148                  | 90.2 |         |
| 45+ years                          | 0                 | 0    | 4        | 10.8 | 33                   | 89.2 |         |
| Education of mother                |                   |      |          |      |                      |      |         |
| Primary                            | 0                 | 0    | 1        | 3.4  | 28                   | 96.6 | 0.36    |

**Table 4** Emotional burden (stress/anxiety, worry, compassion) of the disease stratified by the associated factors ( $n = 527^a$ ) (Continued)

| Factor                                            | Not at all / mild |      | Moderate |      | Severe / very severe |       | $p$  |
|---------------------------------------------------|-------------------|------|----------|------|----------------------|-------|------|
|                                                   | Number            | %    | Number   | %    | Number               | %     |      |
| Secondary / vocational                            | 7                 | 3.7  | 8        | 4.2  | 174                  | 92.1  |      |
| Higher                                            | 5                 | 1.7  | 20       | 6.6  | 278                  | 91.7  |      |
| Education of father                               |                   |      |          |      |                      |       |      |
| Primary                                           | 4                 | 11.1 | 2        | 5.6  | 30                   | 83.3  | 0.01 |
| Secondary / vocational                            | 4                 | 1.6  | 13       | 5.3  | 227                  | 93.0  |      |
| Higher                                            | 4                 | 1.8  | 11       | 5.0  | 207                  | 93.2  |      |
| Family structure                                  |                   |      |          |      |                      |       |      |
| Both parents                                      | 12                | 2.4  | 27       | 5.5  | 452                  | 92.1  | 0.67 |
| Single parent                                     | 0                 | 0    | 2        | 7.1  | 26                   | 92.9  |      |
| Place of residence                                |                   |      |          |      |                      |       |      |
| Urban                                             | 11                | 2.5  | 27       | 6.0  | 410                  | 91.5  | 0.79 |
| Rural                                             | 1                 | 1.5  | 3        | 4.5  | 62                   | 93.9  |      |
| <i>Objective evaluation of the health status</i>  |                   |      |          |      |                      |       |      |
| Vomiting (times per 24 h)                         |                   |      |          |      |                      |       |      |
| 0                                                 | 0                 | 0    | 0        | 0    | 3                    | 100.0 | 0.22 |
| 1                                                 | 4                 | 4.1  | 10       | 10.3 | 83                   | 85.6  |      |
| 2                                                 | 4                 | 1.8  | 9        | 4.0  | 213                  | 94.2  |      |
| 3                                                 | 2                 | 1.2  | 10       | 6.0  | 155                  | 92.8  |      |
| Diarrhea (times per 24 h)                         |                   |      |          |      |                      |       |      |
| 1                                                 | 1                 | 1.6  | 6        | 9.5  | 56                   | 88.9  | 0.54 |
| 2                                                 | 4                 | 3.3  | 6        | 4.9  | 113                  | 91.9  |      |
| 3                                                 | 5                 | 1.6  | 17       | 5.4  | 290                  | 92.9  |      |
| Severity of episode (Vesikari)                    |                   |      |          |      |                      |       |      |
| Moderate                                          | 0                 | 0    | 4        | 11.4 | 31                   | 88.6  | 0.24 |
| Severe / very severe                              | 10                | 2.2  | 25       | 5.4  | 427                  | 92.4  |      |
| <i>Subjective evaluation of the health status</i> |                   |      |          |      |                      |       |      |
| Severity of diarrhea                              |                   |      |          |      |                      |       |      |
| Not at all / mild                                 | 0                 | 0    | 2        | 6.1  | 31                   | 93.9  | 0.48 |
| Moderate                                          | 3                 | 3.9  | 2        | 2.6  | 71                   | 93.4  |      |
| Severe / very severe                              | 8                 | 1.9  | 26       | 6.3  | 378                  | 91.7  |      |
| Severity of vomiting                              |                   |      |          |      |                      |       |      |
| Not at all / mild                                 | 2                 | 1.4  | 12       | 8.4  | 129                  | 90.2  | 0.32 |
| Moderate                                          | 3                 | 3.4  | 2        | 2.3  | 82                   | 94.3  |      |
| Severe / very severe                              | 6                 | 2.1  | 16       | 5.5  | 269                  | 92.4  |      |
| Severity of fever                                 |                   |      |          |      |                      |       |      |
| Not at all / mild                                 | 3                 | 2.1  | 11       | 7.7  | 129                  | 90.2  | 0.84 |
| Moderate                                          | 2                 | 1.8  | 6        | 5.5  | 101                  | 92.7  |      |
| Severe / very severe                              | 6                 | 2.2  | 13       | 4.9  | 248                  | 92.9  |      |
| Severity of abdominal pain                        |                   |      |          |      |                      |       |      |
| Not at all / mild                                 | 6                 | 3.7  | 12       | 7.4  | 145                  | 89.0  | 0.31 |
| Moderate                                          | 1                 | 0.7  | 6        | 4.5  | 127                  | 94.8  |      |

**Table 4** Emotional burden (stress/anxiety, worry, compassion) of the disease stratified by the associated factors ( $n = 527^a$ ) (Continued)

| Factor                                | Not at all / mild |     | Moderate |     | Severe / very severe |      | $p$  |
|---------------------------------------|-------------------|-----|----------|-----|----------------------|------|------|
|                                       | Number            | %   | Number   | %   | Number               | %    |      |
| Severe / very severe                  | 4                 | 1.9 | 10       | 4.8 | 196                  | 93.3 |      |
| Severity of insufficient fluid intake |                   |     |          |     |                      |      |      |
| Not at all / mild                     | 0                 | 0   | 5        | 6.8 | 69                   | 93.2 | 0.41 |
| Moderate                              | 2                 | 2.4 | 2        | 2.4 | 80                   | 95.2 |      |
| Severe / very severe                  | 9                 | 2.5 | 23       | 6.3 | 331                  | 91.2 |      |
| Severity of loss of appetite          |                   |     |          |     |                      |      |      |
| Not at all / mild                     | 2                 | 2.2 | 4        | 4.5 | 83                   | 93.3 | 0.98 |
| Moderate                              | 2                 | 1.9 | 6        | 5.7 | 98                   | 92.5 |      |
| Severe / very severe                  | 7                 | 2.2 | 20       | 6.2 | 295                  | 91.6 |      |
| Severity of apathy                    |                   |     |          |     |                      |      |      |
| Not at all / mild                     | 3                 | 3.5 | 7        | 8.2 | 75                   | 88.2 | 0.60 |
| Moderate                              | 3                 | 2.8 | 5        | 4.7 | 98                   | 92.5 |      |
| Severe / very severe                  | 5                 | 1.6 | 18       | 5.6 | 299                  | 92.9 |      |
| Severity of inflamed bottom           |                   |     |          |     |                      |      |      |
| Not at all / mild                     | 6                 | 2.1 | 22       | 7.7 | 256                  | 90.1 | 0.12 |
| Moderate                              | 3                 | 3.5 | 4        | 4.7 | 79                   | 91.9 |      |
| Severe / very severe                  | 2                 | 1.4 | 3        | 2.0 | 142                  | 96.6 |      |
| Severity of interrupted sleep mode    |                   |     |          |     |                      |      |      |
| Not at all / mild                     | 4                 | 1.5 | 16       | 6.2 | 240                  | 92.3 | 0.73 |
| Moderate                              | 4                 | 3.3 | 5        | 4.1 | 112                  | 92.6 |      |
| Severe / very severe                  | 3                 | 2.2 | 9        | 6.6 | 125                  | 91.2 |      |
| Severity of tearfulness               |                   |     |          |     |                      |      |      |
| Not at all / mild                     | 3                 | 2.0 | 12       | 7.8 | 138                  | 90.2 | 0.46 |
| Moderate                              | 5                 | 3.3 | 7        | 4.6 | 140                  | 92.1 |      |
| Severe / very severe                  | 3                 | 1.4 | 10       | 4.7 | 201                  | 93.9 |      |
| Severity of anxiety / irritability    |                   |     |          |     |                      |      |      |
| Not at all / mild                     | 4                 | 1.8 | 15       | 6.9 | 199                  | 91.3 | 0.53 |
| Moderate                              | 3                 | 2.5 | 9        | 7.4 | 109                  | 90.1 |      |
| Severe / very severe                  | 4                 | 2.2 | 6        | 3.4 | 168                  | 94.4 |      |

indicators of the child's health status. A significant correlation was found only between stress/anxiety and fever (more severe fever corresponded to a higher level of severe stress/anxiety ( $p = 0.003$ )), between stress/anxiety and irritability of the child, between worry and irritability of the child (more intense irritability corresponded to a higher proportion of caregivers reporting severe or very severe stress ( $p < 0.001$ ) or feelings of worry ( $p < 0.001$ )), and between stress or worry and tearfulness of the child (more severe tearfulness corresponded to a higher proportion of parents reporting severe or very severe stress ( $p < 0.001$ ) or worry ( $p = 0.006$ )).

Table 5 (find uploaded as separate file) shows the social burden of the acute rotavirus infection and its associations with different independent variables. No statistically significant associations were found between the necessity to introduce changes in the caregiver's daily routine and the objective health status indicators. The social burden showed statistically significant associations with different sociodemographic factors - older age of the child ( $p < 0.001$ ), older age of the mother ( $p < 0.001$ ) or the father ( $p = 0.03$ ) and higher education level of the mother ( $p < 0.001$ ) corresponded to larger proportions of caregivers reporting a need to introduce changes in their

**Table 5** Social burden (changes in daily routine) of the disease stratified by the associated factors (n = 527)

| Factor                                           | Yes    |      | No     |      | p       |
|--------------------------------------------------|--------|------|--------|------|---------|
|                                                  | Number | %    | Number | %    |         |
| <i>Sociodemographic factors</i>                  |        |      |        |      |         |
| <i>Gender</i>                                    |        |      |        |      |         |
| Female                                           | 211    | 82.4 | 45     | 17.6 | 0.06    |
| Male                                             | 202    | 75.7 | 65     | 24.3 |         |
| <i>Age</i>                                       |        |      |        |      |         |
| ≤ 12 months                                      | 105    | 67.7 | 50     | 32.3 | < 0.001 |
| 13–24 months                                     | 126    | 75.4 | 41     | 24.6 |         |
| 25–36 months                                     | 79     | 89.8 | 9      | 10.2 |         |
| 37+ months                                       | 102    | 91.1 | 10     | 8.9  |         |
| <i>Age of the mother (years)</i>                 |        |      |        |      |         |
| ≤ 24 years                                       | 31     | 56.4 | 24     | 43.6 | < 0.001 |
| 25–34 years                                      | 264    | 79.3 | 69     | 20.7 |         |
| 35–44 years                                      | 111    | 88.8 | 14     | 11.2 |         |
| 45+ years                                        | 5      | 62.5 | 3      | 37.5 |         |
| <i>Age of the father (years)</i>                 |        |      |        |      |         |
| ≤ 24 years                                       | 18     | 66.7 | 9      | 33.3 | 0.03    |
| 25–34 years                                      | 212    | 75.4 | 69     | 24.6 |         |
| 35–44 years                                      | 137    | 85.1 | 24     | 14.9 |         |
| 45+ years                                        | 32     | 86.5 | 5      | 13.5 |         |
| <i>Education of the mother</i>                   |        |      |        |      |         |
| Primary                                          | 18     | 62.1 | 11     | 37.9 | < 0.001 |
| Secondary / vocational                           | 133    | 71.1 | 54     | 28.9 |         |
| Higher                                           | 257    | 85.1 | 45     | 14.9 |         |
| <i>Education of the father</i>                   |        |      |        |      |         |
| Primary                                          | 24     | 70.6 | 10     | 29.4 | 0.30    |
| Secondary / vocational                           | 190    | 78.2 | 53     | 21.8 |         |
| Higher                                           | 181    | 81.5 | 41     | 18.5 |         |
| <i>Family structure</i>                          |        |      |        |      |         |
| Both parents                                     | 386    | 79.1 | 102    | 20.9 | 0.61    |
| Single parent                                    | 21     | 75.0 | 7      | 25.0 |         |
| <i>Place of residence</i>                        |        |      |        |      |         |
| Urban                                            | 350    | 78.5 | 96     | 21.5 | 0.57    |
| Rural                                            | 53     | 81.5 | 12     | 18.5 |         |
| <i>Objective evaluation of the health status</i> |        |      |        |      |         |
| <i>Vomiting (times per 24 h)</i>                 |        |      |        |      |         |
| 0                                                | 1      | 33.3 | 2      | 66.7 | 0.08    |
| 1                                                | 70     | 72.2 | 27     | 27.8 |         |
| 2                                                | 178    | 79.1 | 47     | 20.9 |         |
| 3                                                | 135    | 81.3 | 31     | 18.7 |         |
| <i>Diarrhea (times per 24 h)</i>                 |        |      |        |      |         |
| 1                                                | 48     | 77.4 | 14     | 22.6 | 0.07    |
| 2                                                | 87     | 71.3 | 35     | 28.7 |         |

**Table 5** Social burden (changes in daily routine) of the disease stratified by the associated factors (n = 527) (Continued)

| Factor                                            | Yes    |      | No     |      | p    |
|---------------------------------------------------|--------|------|--------|------|------|
|                                                   | Number | %    | Number | %    |      |
| 3                                                 | 254    | 81.4 | 58     | 18.6 |      |
| <i>Severity of episodes (Vesikari)</i>            |        |      |        |      |      |
| Moderate                                          | 24     | 68.6 | 11     | 31.4 | 0.13 |
| Severe / very severe                              | 366    | 79.6 | 94     | 20.4 |      |
| <i>Subjective evaluation of the health status</i> |        |      |        |      |      |
| <i>Severity of diarrhea</i>                       |        |      |        |      |      |
| Not at all / mild                                 | 24     | 72.7 | 9      | 27.3 | 0.36 |
| Moderate                                          | 56     | 74.7 | 19     | 25.3 |      |
| Severe / very severe                              | 330    | 80.3 | 81     | 19.7 |      |
| <i>Severity of vomiting</i>                       |        |      |        |      |      |
| Not at all / mild                                 | 110    | 77.5 | 32     | 22.5 | 0.23 |
| Moderate                                          | 63     | 73.3 | 23     | 26.7 |      |
| Severe / very severe                              | 237    | 81.4 | 54     | 18.6 |      |
| <i>Severity of fever</i>                          |        |      |        |      |      |
| Not at all / mild                                 | 102    | 71.8 | 40     | 28.2 | 0.02 |
| Moderate                                          | 94     | 85.5 | 16     | 14.5 |      |
| Severe / very severe                              | 215    | 80.8 | 51     | 19.2 |      |
| <i>Severity of abdominal pain</i>                 |        |      |        |      |      |
| Not at all / mild                                 | 123    | 75.9 | 39     | 24.1 | 0.63 |
| Moderate                                          | 105    | 78.9 | 28     | 21.1 |      |
| Severe / very severe                              | 168    | 80.0 | 42     | 20.0 |      |
| <i>Severity of insufficient fluid intake</i>      |        |      |        |      |      |
| Not at all / mild                                 | 50     | 68.5 | 23     | 31.5 | 0.04 |
| Moderate                                          | 63     | 76.8 | 19     | 23.2 |      |
| Severe / very severe                              | 296    | 81.5 | 67     | 18.5 |      |
| <i>Severity of loss of appetite</i>               |        |      |        |      |      |
| Not at all / mild                                 | 64     | 72.2 | 24     | 27.3 | 0.06 |
| Moderate                                          | 78     | 74.3 | 27     | 25.7 |      |
| Severe / very severe                              | 264    | 82.2 | 57     | 17.8 |      |
| <i>Severity of apathy</i>                         |        |      |        |      |      |
| Not at all / mild                                 | 60     | 71.4 | 24     | 28.6 | 0.14 |
| Moderate                                          | 85     | 81.0 | 20     | 19.0 |      |
| Severe / very severe                              | 260    | 81.0 | 61     | 19.0 |      |
| <i>Severity of inflamed bottom</i>                |        |      |        |      |      |
| Not at all / mild                                 | 219    | 77.9 | 62     | 22.1 | 0.60 |
| Moderate                                          | 82     | 82.8 | 15     | 17.2 |      |
| Severe / very severe                              | 117    | 80.1 | 29     | 19.9 |      |
| <i>Severity of interrupted sleep mode</i>         |        |      |        |      |      |
| Not at all / mild                                 | 199    | 77.1 | 59     | 22.9 | 0.48 |

**Table 5** Social burden (changes in daily routine) of the disease stratified by the associated factors ( $n = 527$ ) (Continued)

| Factor                             | Yes    |      | No     |      | <i>p</i> |
|------------------------------------|--------|------|--------|------|----------|
|                                    | Number | %    | Number | %    |          |
| Moderate                           | 96     | 79.3 | 25     | 20.7 |          |
| Severe / very severe               | 112    | 82.4 | 24     | 17.6 |          |
| Severity of tearfulness            |        |      |        |      |          |
| Not at all / mild                  | 116    | 76.3 | 36     | 23.7 | 0.59     |
| Moderate                           | 123    | 80.9 | 29     | 19.1 |          |
| Severe / very severe               | 169    | 79.7 | 43     | 20.3 |          |
| Severity of anxiety / irritability |        |      |        |      |          |
| Not at all / mild                  | 168    | 77.4 | 49     | 22.6 | 0.64     |
| Moderate                           | 98     | 81.0 | 23     | 19.0 |          |
| Severe / very severe               | 142    | 80.7 | 34     | 19.3 |          |

daily routine because of the rotavirus infection (such as sporting, educational or culture events/activities).

Out of all subjective health status indicators, only fever (similarly to the emotional burden) and insufficient fluid intake were significantly associated with the social burden of the disease. That is, a larger proportion of caregivers reported needing to introduce changes in their daily routine when their child had more severe fevers ( $p = 0.02$ ) or insufficient fluid intake ( $p = 0.04$ ).

Finally, Table 6 (find uploaded as separate file) reveals the factors that increased the economic burden of rotavirus infection. None of the objective health status indicators significantly influenced the working abilities of the parents. Only two sociodemographic factors showed a significant impact on the economic burden of the disease: a higher age of the child ( $p = 0.01$ ) and higher level of education of the mother ( $p = 0.02$ ) corresponded to a larger proportion of respondents reporting the need to be absent from work for at least 1 day.

Out of all subjective health status indicators, only insufficient fluid intake (like the social burden) and inflamed bottom seems to increase the economic burden of the infection. A larger proportion of caregivers reported the need to be absent from work for cases of more severe insufficient fluid intake ( $p = 0.02$ ) or inflamed bottom ( $p = 0.03$ ) of their child.

Therefore, it can be concluded that the objective health status of the child does not influence the emotional, social or economic burden of the rotavirus infection, whereas the parents' subjective perceptions of the child's health status and some sociodemographic characteristics, such as the age of the child and the age or education of parents do influence the burden.

## Discussion

This study reveals the impact of rotavirus gastroenteritis on HRQL of families whose children are affected. As the disease is characterized by a sudden onset, it can disrupt daily routine, require unexpected changes, and thus, can affect the physical, emotional and social wellbeing of the child and family. The results show that an acute illness negatively effects the family and increases their emotional, social and economic disease burden. Parents reported moderate or severe parental distress, worry and anxiety, as well as intense feelings of an exhaustion, helplessness and despair. This is consistent with the results of other studies that also reported parental emotions and feelings due to a child's illness. Parents reported high distress levels during the episode of rotavirus gastroenteritis [5, 17, 18] and felt exhausted and helpless [18]. Our study concludes that parents of hospitalized children are faced with disruptions of their daily routine and social activities. This fact has also been established in similar studies [17]. The economic burden of disease is related to lost days of work and additional expenditures. In our study and other studies, parents experienced lost work days [5, 20] and additional expenditures. [17, 21].

Current research has shown that stress, anxiety, worry and compassion are the most often (and more intense) feelings experienced by parents due a child's illness. Based on a subjective assessment of disease symptoms, parents reported that severe fever of the child, irritability and tearfulness promoted higher parental stress levels. Emotional reactions, to a certain extent, are socially formatted and structured [22]. Parental responses to a child's symptoms and their subsequent emotional feelings can be incorporated and interpreted in a cultural framework. In Latvia, fever in children is possibly overestimated as an abnormal and potentially life-threatening condition. This, in turn, can lead to excessive parental stress reactions. Cultural and personal beliefs held by parents also influence perceptions of how a "healthy child" should look and behave [23]. Tearfulness and irritability are usually not associated with the image of a healthy child in Latvia, and these symptoms can provoke more intense levels of parental distress, worry and anxiety. Cultural factors regarding the impact of rotavirus gastroenteritis on families were analyzed in an ethnographic study in Taiwan and Vietnam [21]; another study also compared the emotional reactions of Spanish, Italian and Polish parents due to childhood acute rotavirus gastroenteritis. To help parents manage their child's health needs during an acute illness and their own perceptions and reactions toward their child's symptoms, sufficient parental health education is required [24]. A successful and mutual physician-parent communication, as the foundation of the therapeutic relationship, is an essential tool for better social support [25]; otherwise,

**Table 6** Economic burden (days off work) of the disease stratified by the associated factors ( $n = 527^a$ )

| Factor                                           | None   |       | At least one |      | Not employed |      | <i>p</i> |
|--------------------------------------------------|--------|-------|--------------|------|--------------|------|----------|
|                                                  | Number | %     | Number       | %    | Number       | %    |          |
| <i>Sociodemographic factors</i>                  |        |       |              |      |              |      |          |
| Gender                                           |        |       |              |      |              |      |          |
| Female                                           | 81     | 31.6  | 148          | 57.8 | 27           | 10.5 | 0.49     |
| Male                                             | 92     | 34.5  | 141          | 52.8 | 34           | 12.7 |          |
| Age                                              |        |       |              |      |              |      |          |
| ≤ 12 months                                      | 67     | 43.8  | 61           | 39.9 | 25           | 16.3 | 0.01     |
| 13–24 months                                     | 56     | 33.3  | 96           | 57.1 | 16           | 9.5  |          |
| 25–36 months                                     | 22     | 24.7  | 57           | 64.0 | 10           | 11.2 |          |
| 37+ months                                       | 28     | 25.0  | 74           | 66.1 | 10           | 8.9  |          |
| Age of the mother                                |        |       |              |      |              |      |          |
| ≤ 24 years                                       | 17     | 31.5  | 28           | 51.9 | 9            | 16.7 | 0.84     |
| 25–34 years                                      | 110    | 32.9  | 188          | 56.3 | 36           | 10.8 |          |
| 35–44 years                                      | 41     | 32.8  | 69           | 55.2 | 15           | 12.0 |          |
| 45+ years                                        | 4      | 50.0  | 3            | 37.5 | 1            | 12.5 |          |
| Age of the father                                |        |       |              |      |              |      |          |
| ≤ 24 years                                       | 11     | 42.3  | 11           | 42.3 | 4            | 15.4 | 0.48     |
| 25–34 years                                      | 95     | 33.9  | 152          | 54.3 | 33           | 11.8 |          |
| 35–44 years                                      | 54     | 33.1  | 92           | 56.4 | 17           | 10.4 |          |
| 45+ years                                        | 7      | 18.9  | 25           | 67.6 | 5            | 13.5 |          |
| Education of the mother                          |        |       |              |      |              |      |          |
| Primary                                          | 14     | 48.3  | 12           | 41.4 | 3            | 10.3 | 0.02     |
| Secondary / vocational                           | 73     | 39.0  | 85           | 45.5 | 29           | 15.5 |          |
| Higher                                           | 85     | 28.1  | 188          | 62.3 | 29           | 9.6  |          |
| Education of the father                          |        |       |              |      |              |      |          |
| Primary                                          | 12     | 35.3  | 16           | 47.1 | 6            | 17.6 | 0.41     |
| Secondary / vocational                           | 82     | 33.6  | 140          | 57.4 | 22           | 9.0  |          |
| Higher                                           | 71     | 32.1  | 120          | 54.3 | 30           | 13.6 |          |
| Family structure                                 |        |       |              |      |              |      |          |
| Both parents                                     | 159    | 32.6  | 271          | 55.5 | 58           | 11.9 | 0.64     |
| Single parent                                    | 11     | 39.3  | 15           | 53.6 | 2            | 7.1  |          |
| Place of residence                               |        |       |              |      |              |      |          |
| Urban                                            | 145    | 32.6  | 245          | 55.1 | 55           | 12.4 | 0.53     |
| Rural                                            | 23     | 34.8  | 38           | 57.6 | 5            | 7.6  |          |
| <i>Objective evaluation of the health status</i> |        |       |              |      |              |      |          |
| Vomiting (times per 24 h)                        |        |       |              |      |              |      |          |
| 0                                                | 3      | 100.0 | 0            | 0    | 0            | 0    | 0.28     |
| 1                                                | 32     | 33.3  | 50           | 52.1 | 14           | 14.6 |          |
| 2                                                | 78     | 34.7  | 123          | 54.7 | 24           | 10.7 |          |
| 3                                                | 52     | 31.1  | 95           | 56.9 | 20           | 12.0 |          |
| Diarrhea (times per 24 h)                        |        |       |              |      |              |      |          |
| 1                                                | 23     | 36.5  | 33           | 52.4 | 7            | 11.1 | 0.95     |
| 2                                                | 40     | 32.5  | 66           | 53.7 | 17           | 13.8 |          |

**Table 6** Economic burden (days off work) of the disease stratified by the associated factors ( $n = 527^a$ ) (Continued)

| Factor                                     | None   |      | At least one |      | Not employed |      | <i>p</i> |
|--------------------------------------------|--------|------|--------------|------|--------------|------|----------|
|                                            | Number | %    | Number       | %    | Number       | %    |          |
| 3                                          | 104    | 33.5 | 170          | 54.8 | 36           | 11.6 |          |
| Severity of episodes (Vesikari)            |        |      |              |      |              |      |          |
| Moderate                                   | 14     | 40.0 | 17           | 48.6 | 4            | 11.4 | 0.70     |
| Severe / very severe                       | 152    | 33.0 | 252          | 54.8 | 56           | 12.2 |          |
| Subjective evaluation of the health status |        |      |              |      |              |      |          |
| Severity of diarrhea                       |        |      |              |      |              |      |          |
| Not at all / mild                          | 13     | 39.4 | 17           | 51.5 | 3            | 9.1  | 0.43     |
| Moderate                                   | 31     | 40.8 | 39           | 51.3 | 6            | 7.9  |          |
| Severe / very severe                       | 128    | 31.2 | 232          | 56.6 | 50           | 12.2 |          |
| Severity of vomiting                       |        |      |              |      |              |      |          |
| Not at all / mild                          | 55     | 38.7 | 71           | 50.0 | 16           | 11.3 | 0.26     |
| Moderate                                   | 27     | 31.0 | 46           | 52.9 | 14           | 16.1 |          |
| Severe / very severe                       | 90     | 30.9 | 171          | 58.8 | 30           | 10.3 |          |
| Severity of fever                          |        |      |              |      |              |      |          |
| Not at all / mild                          | 54     | 38.0 | 70           | 49.3 | 18           | 12.7 | 0.19     |
| Moderate                                   | 27     | 24.8 | 69           | 63.3 | 13           | 11.9 |          |
| Severe / very severe                       | 90     | 33.7 | 150          | 56.2 | 27           | 10.1 |          |
| Severity of abdominal pain                 |        |      |              |      |              |      |          |
| Not at all / mild                          | 61     | 37.4 | 84           | 51.5 | 18           | 11.0 | 0.12     |
| Moderate                                   | 51     | 38.3 | 71           | 53.4 | 11           | 8.3  |          |
| Severe / very severe                       | 57     | 27.1 | 124          | 59.0 | 29           | 13.8 |          |
| Severity of insufficient fluid intake      |        |      |              |      |              |      |          |
| Not at all / mild                          | 32     | 43.8 | 28           | 38.4 | 13           | 17.8 | 0.02     |
| Moderate                                   | 30     | 35.7 | 43           | 51.2 | 11           | 13.1 |          |
| Severe / very severe                       | 110    | 30.4 | 216          | 59.7 | 36           | 9.9  |          |
| Severity of loss of appetite               |        |      |              |      |              |      |          |
| Not at all / mild                          | 39     | 44.3 | 39           | 44.3 | 10           | 11.4 | 0.06     |
| Moderate                                   | 39     | 36.8 | 54           | 50.9 | 13           | 12.3 |          |
| Severe / very severe                       | 93     | 29.0 | 192          | 59.8 | 36           | 11.2 |          |
| Severity of apathy                         |        |      |              |      |              |      |          |
| Not at all / mild                          | 33     | 39.8 | 39           | 47.0 | 11           | 13.3 | 0.20     |
| Moderate                                   | 34     | 32.4 | 55           | 52.4 | 16           | 15.2 |          |
| Severe / very severe                       | 99     | 30.7 | 192          | 59.4 | 32           | 9.9  |          |
| Severity of inflamed bottom                |        |      |              |      |              |      |          |
| Not at all / mild                          | 81     | 28.7 | 174          | 61.7 | 27           | 9.6  | 0.03     |
| Moderate                                   | 37     | 42.5 | 38           | 43.7 | 12           | 13.8 |          |
| Severe / very severe                       | 53     | 36.3 | 74           | 50.7 | 19           | 13.0 |          |
| Severity of interrupted sleep mode         |        |      |              |      |              |      |          |
| Not at all / mild                          | 89     | 34.4 | 148          | 57.1 | 22           | 8.5  | 0.33     |
| Moderate                                   | 37     | 30.6 | 66           | 54.5 | 18           | 14.9 |          |
| Severe / very severe                       | 45     | 33.1 | 72           | 52.9 | 19           | 14.0 |          |



**Table 6** Economic burden (days off work) of the disease stratified by the associated factors ( $n = 527^a$ ) (Continued)

| Factor                             | None   |      | At least one |      | Not employed |      | <i>p</i> |
|------------------------------------|--------|------|--------------|------|--------------|------|----------|
|                                    | Number | %    | Number       | %    | Number       | %    |          |
| Severity of tearfulness            |        |      |              |      |              |      |          |
| Not at all / mild                  | 53     | 34.9 | 80           | 52.6 | 19           | 12.5 | 0.92     |
| Moderate                           | 47     | 30.7 | 88           | 57.5 | 18           | 11.8 |          |
| Severe / very severe               | 71     | 33.5 | 118          | 55.7 | 23           | 10.8 |          |
| Severity of anxiety / irritability |        |      |              |      |              |      |          |
| Not at all / mild                  | 69     | 31.7 | 121          | 55.5 | 28           | 12.8 | 0.27     |
| Moderate                           | 34     | 28.1 | 76           | 62.8 | 11           | 9.1  |          |
| Severe / very severe               | 67     | 38.1 | 90           | 51.1 | 19           | 10.8 |          |

<sup>a</sup>The sum of the stratified numbers can differ according to the parameters due to missing values

lack of communication with a child's parents can lead to misunderstandings and cause additional stress. The social burden of disease is an essential domain of HRQL. This study revealed that older mothers and fathers more often reported the need to unexpectedly change their daily routine because of their child's acute illness, which was also true for mothers with higher education levels. This finding could be explained by the group of parents aged 35 or more as having more social duties and activities. Parents reported that severe fever and insufficient fluid intake were the most prevalent symptoms of their child that caused disruption of their daily schedule. This could be linked to cultural issues, parental education and health communication. In Latvia, information on child dehydration is broadly released, and the notion that children should drink fluids is strongly embodied in public discourses and practices.

Our study revealed that the main aspect of economic burden is the loss of work days. The larger proportion of parents (caregivers) experienced absence from work for at least 1 day due to a childhood rotavirus gastroenteritis when the child was of higher age. This finding could be explained by paid parental leave in Latvia, that covers first year of life. As children grow older, both parents usually are employed and sick-leave usually is required. Mothers with the higher educational levels more often reported the need to be absent from work at least 1 day. A possible explanation could be related to job specificity (duties, responsibility, etc.) and/or better social insurance and social security system. Parents reported that an inflamed bottom and insufficient fluid intake were the most prevalent symptoms of their child that led to lost work days, which could be linked to cultural and informational issues regarding symptom perception and management.

This study confirmed that acute childhood rotavirus gastroenteritis places a considerable burden on families. It affects all domains of HRQL. This study provides in-depth insight into parental subjective evaluation of their child's symptoms and their reactions to these symptoms. These

results are important for promoting better communication between physicians and parents.

Additional research may be necessary to identify more profound factors and to measure the associations among factors in considering the current development of conceptual frameworks for HRQL assessment in acute gastroenteritis [26].

This study has several limitations. First, the results are not fully generalizable, as only hospitalized children and their families were included. Thus, the results may not be relevant upon extrapolation to milder cases of rotavirus infection.

## Conclusions

In this study, we found that the objective health status of the child did not influence the emotional, social or economic burden of rotavirus infection, but rather parents' subjective perceptions of their child's health status and sociodemographic characteristics such as the age of the child or the age or education of parents did affect their burden.

A better understanding of how acute episode affect the child and the child's family could help to ease parental fears and advice parents on the characteristics of rotavirus infection and the optimal care of an affected child.

## Abbreviations

CI: Confidence interval; HRQL: Health-related quality of life; n: Absolute number; OR: Odds ratio; PCR: Polymerase chain reaction

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## Availability of data and materials

The datasets generated and analyzed during the current study are available in the Zenodo repository.

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#### Authors' contributions

GL developed the clinical and social demographic parts of the questionnaire and was responsible for patient involvement, data collection, and preparation and submission of the manuscript. MC participated in patient involvement and data entry. AK participated in the development of the questionnaire, developed the platform for data entry, drafted the manuscript and performed the statistical analysis. IS participated in the development of the questionnaire and preparation of the manuscript. IG participated in the development of the clinical and social demographic parts of the questionnaire and preparation of the manuscript. DG was the project manager and supervisor. All authors read and approved the final manuscript.

#### Ethics approval and consent to participate

The study was conducted in accordance with the Helsinki declaration and good clinical practice guidelines. The protocol and study consent were reviewed and approved by the ethical committee of Riga Stradins University and by the Institutional Review Board of Children's Clinical University Hospital (No. 22/30.05.2013.)

All involved legal care givers signed consent of participation and written informed consent was obtained from the parents for analyzation and publication of collected data.

#### Consent for publication

All involved legal care givers signed consent of participation and written informed consent was obtained from the parents for analyzation and publication of collected data.

#### Competing interests

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