Acceptance Code EE391

The economic burden of varicella among children in France — a societal perspective

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Introduction

- Varicella-zoster virus is a highly contagious virus that causes varicella (chickenpox) upon primary infection[1,2]
- Universal varicella vaccination (UVV) has led to a substantial decrease in varicella morbidity, mortality, and costs in Europe[3]
- There is no UVV in France.[3] Varicella vaccination is recommended only for high-risk groups or those aged 11-12 years without history of prior disease[4]
- There is limited evidence on the economic burden of varicella from the healthcare system and societal perspectives[3]

Objective

- To estimate the economic burden of pediatric varicella in France from the societal perspective

Methods

- We conducted a non-interventional, cross-sectional survey study in France (April-July 2022) among 185 French parents or legal guardians of children (<18 years of age) diagnosed with varicella in the previous 6 weeks
- The survey collected information on the sociodemographic characteristics of children and their parents, healthcare resource utilization (HCRU) associated with varicella, out-of-pocket costs incurred by the families, school days missed, and workdays lost to care for the child with varicella
- Direct medical costs included those covered by the French social security system as well as the out-of-pocket costs incurred by families. Indirect costs were calculated by multiplying reported missed workdays by the average daily wage of €182.3[5]
- The mean societal (direct + indirect) cost of varicella obtained from the survey was multiplied by the annual number of pediatric varicella cases reported in France in 2019 (525,184 cases) to estimate the annual national societal burden of pediatric varicella[6]
- Descriptive statistics were used to summarize sociodemographic, resource utilization, and cost data. All costs were reported in 2022 €

Results

Demographic characteristics

- The mean age of children with varicella was 4.4 years old (range: 0-17 years; standard deviation, SD 3.5 years), and almost 40% were between 3 and 6 years of age. Slightly over half were male (54.1%). Nearly two thirds (64.3%) attended preschool and 26.5% attended grade school (**Table 1**)
- The mean age of parents/legal guardians was 34.2 years, 82.7% were female, and 80% were married. Nearly two thirds (63.8% of respondents and 73% of partners) were employed full-time

Table 1. Demographic characteristics

Variable	Total N=185
Child	
Age (years), Mean (SD)	4.4 (3.5)
Sex (male), n (%)	100 (54.1%)
School, n (%)	
Attending preschool	119 (64.3%)
Attending grade school	49 (26.5%)
Not school age	15 (8.1%)
Homeschooled/other	2 (1.1%)
Parent or legal guardian	
Age (years), Mean (SD)	34.2 (6.3)
Sex (female), n (%)	153 (82.7%)
Marital status (married), n (%)	148 (80.0%)
Respondent's work status, n (%)	
Full-time	118 (63.8%)
Part-time	28 (15.1%)
Other	39 (21.1%)
Partner's work status, n (%)	
Full-time	135 (73.0%)
Part-time	6 (3.2%)
Other	7 (3.8%)
Not applicable/Missing	37 (20.0%)

Healthcare utilization and medication use

- Nearly all (95.1%) children with varicella had at least 1 outpatient visit, 10.3% had at least 1 emergency room (ER) visit, and 2.2% were hospitalized
- The mean number of outpatient visits was 1.5 (SD 2.1) across the sample. Four children were hospitalized; their mean length of stay was 5 days
- While 91.9% of children used analgesics, 55.7% used antihistamines, 14.6% used at least 1 antibiotic, and 10.3% used at least 1 antiviral

Missed work and school days

- Overall, 113 children (61.1%) had at least 1 parent/guardian miss ≥1 workday to care for them while sick; 618 such workdays were lost by parents (**Table 2**)
- In addition, 27 children (14.6%) had a grandparent, family member, or friend miss ≥1 workday to care for them while sick; 122 such workdays were lost
- In total, 740 workdays were lost by parents, relatives, or friends, with a mean of 4.0 (SD 6.0) workdays lost per child
- 867 school days were missed by 170 children who were attending preschool/grade school, with a mean of 5.1 (SD 4.0) school days missed per child

Table 2. Impact of varicella on workdays

Person taking time off to care for child with varicella	≥1 missed workday, n (%)	Total workdays lost	Average workdays lost across 185 children, mean (SD)
Either parent or partner	113 (61.1%)	618	3.3 (5.1)
Parent responding to survey	105 (56.8%)	486	2.6 (4.4)
Other parent/partner	43 (23.2%)	132	0.7 (1.8)
Grandparent/other family member/friend	27 (14.6%)	122	0.7 (2.2)
Total productivity loss		**740 workdays**	**4.0 (6.0)**

Economic burden of varicella

- Varicella infection incurred a total mean (direct + indirect) cost of €857.7 (SD: €1232.6) per child (**Table 3**)
- The mean indirect cost was €729.4 (SD €1088.9), accounting for 85% of the total cost. The mean direct cost per child was €128.3 (SD €289.9), of which the mean out-of-pocket direct cost incurred by the family was €53.8 (SD €72.2)

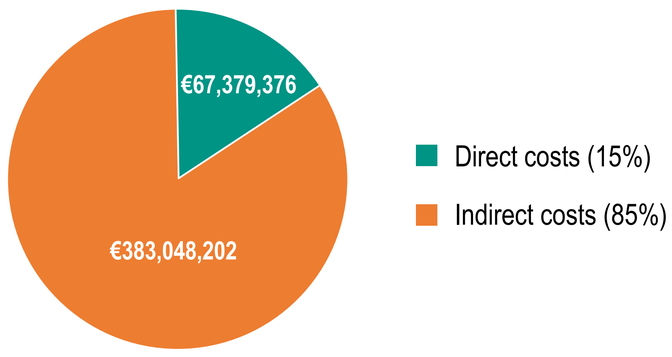
Table 3. Direct and indirect costs of varicella

Type of cost associated with varicella	Per-child costs (2022 €) Mean (SD)
Total direct cost per child with varicella	**€128.3 (€289.9)**
Direct medical cost covered by French social security system	**€74.5 (€257.5)**
Out-of-pocket direct cost to the family	**€53.8 (€72.2)**
Medical and nonmedical cost (eg, transportation)	€50.9 (€67.8)
Paid caregiver cost	€1.6 (€13.2)
Cost associated with isolation or preventive measures for high-risk family members	€1.4 (€15.1)
Total indirect cost per child with varicella	**€729.4 (€1088.9)**
Total societal cost per child with varicella (direct + indirect)	**€857.7 (€1232.6)**

National burden of varicella

- We estimated the total annual national societal cost of varicella to be € 450,427,578 (95% CI: €357,144,287 - 543,710,868), with indirect costs accounting for 85% (**Figure 1**)

Figure 1. Estimated annual national burden of pediatric varicella in France (2022 €)



Limitations

- This was a cross-sectional survey study and used a convenience sample, limiting generalizability of the study results
- Assumptions for costs may also impact results, though we used conservative estimates

Conclusion

- Varicella is associated with significant caregiver as well as economic burden in France
  - Over 60% of parents missed at least 1 workday to take care of their sick child
  - The mean cost of varicella per child was €857.7 (€1232.6), primarily driven by indirect costs (85%)
  - The economic burden of pediatric varicella in France is estimated to be significant, at €450 million annually
- This study may be of interest to policy makers in France and other European countries evaluating UVV programs to reduce the burden of disease

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Disclosure

This study was funded by Merck Sharp & Dohme LLC, a subsidiary of Merck & Co., Inc., Rahway, NJ, USA.

Presented at ISPOR-EU; Copenhagen, Denmark; November 12-15, 2023.