

THE DISEASE BURDEN OF VARICELLA IN HUNGARY

Emese Tóth¹, Katalin Érsek¹, Bence Nagy¹, Zsófia Mészner², Andrea Kulcsár³

¹Healthware Consulting Ltd., ²National Institute of Child Health;

³ United Szent István-Szent László Hospital – Clinic



BACKGROUND

The varicella is one of the most common virulent illness of children, that mostly typical in the age group 2-6 years. According to estimates the incidence of the disease is approximately 400-500/100 thousand by the public data, however opinions of experts assume substantially higher rates than this. In 2,5% of the cases of individuals with uninjured immune function, the disease proceeds with complications (bacterial over infection, meningitis, meningoencephalitis and pneumonia are the most frequent complications), and without treatment it can be potentially life threatening in immunocompromising individuals. In the varicella experienced individuals, shingles evolves as the reactivation of the varicella-zoster (VZ) virus. According to a Hungarian survey, approximately 75% of the cases with complications apparent in the <2 years population, and neurological complications are apparent in 0,1-1% of the patients. Nearly 50% of the varicella regarding hospitalizations caused by the secondary complication of the infection, the bacterial infection.

Immunity against VZ infection can be evolved by multiple ways: natural infection, passive and active immunization. Varicella can be prevented with the use of a live attenuated vaccine, including varicella-zoster virus. According to WHO recommendation these vaccines are safe, effective, and should be implemented into the recommended age-related vaccines. With the general introduction of the vaccination against varicella-zoster infection complications and potential deaths can be avoided and the infection can be potentially eradicated with the elimination of the disease.

However the vaccine is available in Hungary for more than a decade, according to estimates the vaccination is only 10-15%. Several studies demonstrated the efficacy and safety of the vaccine in healthy individuals. After the administration of the whole vaccination series a sero-conversion rate of 95% can be reached, and the protective effect is hold up on the long run. Therefore the vaccination can avoid the evolution of serious events and complications, that long term effects and additional costs can provide comparable savings with the vaccination costs for the financier considering overall societal viewpoint.

OBJECTIVES

Aim of the study was to examine the lifelong consequences of varicella infection in Hungary.

METHODS

In our analysis the Hungarian varicella related therapeutic and preventive practice and the costs of this disease were investigated. The analysis was primarily focused on the direct burdens of varicella, thus calculations with the shingles related care and with the sunk costs caused by the disease weren't made. During our study the disease burden (direct healthcare cost, costs of complicated and serious cases and the related indirect costs) of varicella in Hungary was calculated by resource utilization of health care service data as well as specialist' opinion.

Data analysis based on NHIFA data

For estimating the real costs of varicella, the whole healthcare records of the Hungarian patients (redemption of drugs and medical aids, inpatient and outpatient services) were utilized. During the processing of data, patients were identified, who appeared with varicella infection (ICD-10 code B01, P3781) in the healthcare system during the study period: 2005-2010. Since the varicella related statistical documentation is not unified (HCSO - Hungarian Central Statistical Office, NHIFA - National Health Insurance Fund and Administration, National Epidemiology Center), study population was approached the following inclusion criteria, listed at Table 1.:

Table 1. Patients groups studied under the analysis

Patient group	Definition of patient group
1	patients with varicella appearing in the outpatient or inpatient services
2	patients with varicella appearing in the outpatientservice
3	patient with varicella appearing in the inpatient service
4	patients redeeming prescription for varicella

In our analysis patients appearing in the active inpatient with varicella as well as the patients experiencing serious complications were defined by the NHIFA data. ICD-10 code and DRG screening were used for identifying the affected patients.

Table 2. The used definitions in hospitalised and complicated cases

Event	Definition	Studied fund	ICD-10 code	DRG
inpatient service	varicella related ICD-10 code and DRG appearing in inpatient service	inpatient	B01, P3781	0200, 9631, 019A, 060Z, 141A, 141C, 142C, 174Z, 803A, 803D, 803E, 819Z
complicated events	ICD-10 code and DRG of meningitis, meningoencephalitis, pneumonia	outpatient, inpatient	B0100, B0110, B0120, B0180 or B0190 and after registered within 1 month B0010, B0030, B0040, G0200, G0510, G0580, J1291, J1292, J1710, J1780	019A, 0200, 060Z, 141A, 142C, 174Z, 803A, 803D, 819Z

Costs of the direct expenditures on the identified patient group were determined at NHIFA database. The relevant items were sorted out from the drug, medical aid, out-and inpatient care services. Unit costs were calculated on official list prices. The total payments of the sickness benefits were considered, while the absence of ICD-10 code.

Questionnaire survey

A questionnaire survey was undertaken for the investigation of the current Hungarian therapeutic and preventive practice of specialists and pediatricians. During our questionnaire survey we focused on the definition of the general vaccination status and the disease related indirect costs. Survey was investigated with four specialists.

RESULTS

Hungarian varicella patient numbers

Table 3. Number of identified patients in the patient groups

Year	1. patient group in- or outpatient service	2. patient group outpatient service	3. patient group inpatient service	4. patient group prescription
2005	3 274	2 979	349	na*
2006	3 449	3 132	364	9 401*
2007	3 320	2 981	404	56 090
2008	2 185	1 917	315	39 369
2009	2 515	2 204	343	42 630
2010	2 232	1 945	338	41 280

*Data are not available for 2005, naming of ICD-10 code is compulsory on the prescription since 2006

REFERENCES:

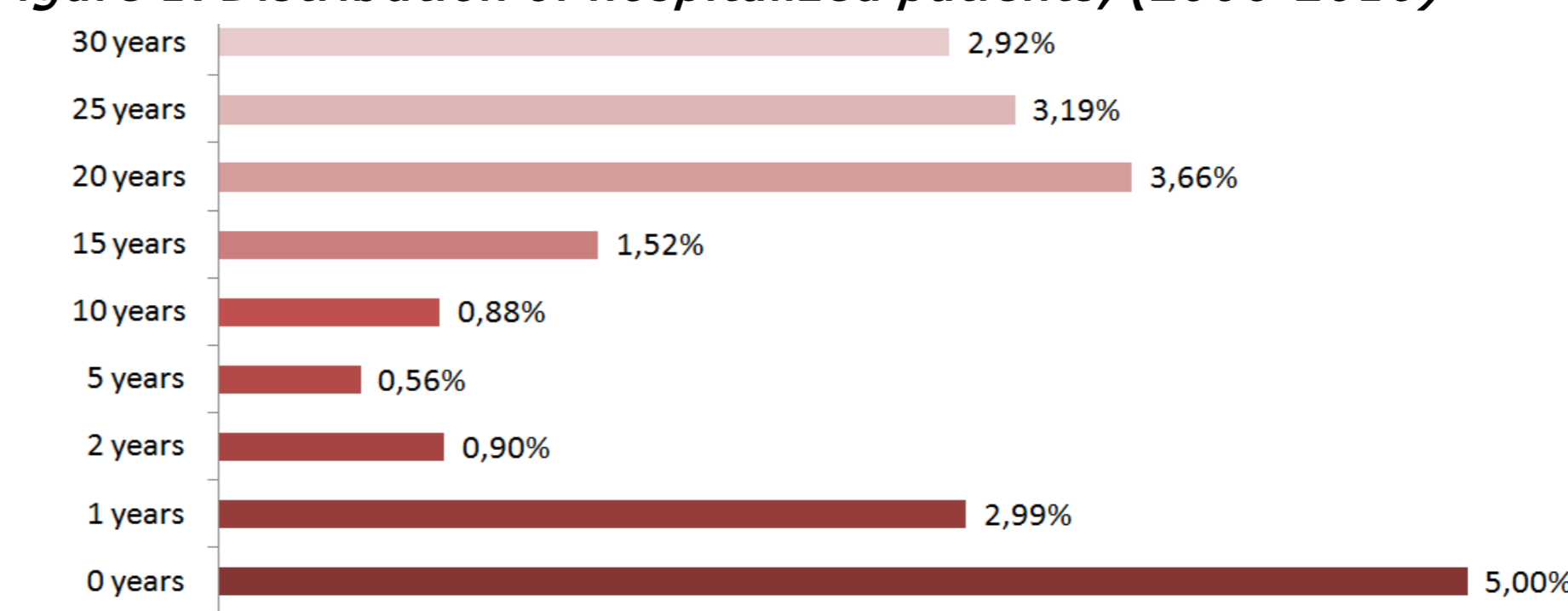
- Az Egészségügyi Minisztérium szakmai irányelve: A varicella kezeléséről és megelőzéséről. Az oltások és műtétek egybeesése esetén szükséges teendőkről. Egészségügyi Közlöny 2009; 21:3119-3127.
- Az Országos Epidemiológiai Központ módszertani levele: a 2011. évi védőoltásokról. Epinfó 2011;18. 1. Különszám.
- Dr. Pék Tamás, Dr. Tupcsia Zita: Szövődményes varicella infekciók 2010-ben. Fővárosi Önkormányzat Egyesített Szent István és Szent László Kórház, Gyermekgyógyászati Osztály
- Liptai Zoltán: A varicella neurológiai szövődményei – Hazai és nemzetközi tapasztalatok. Gyermekgyógyászat 2009; 60. évfolyam 4. szám
- Mészner Zs.: A varicella-zoster vírus fertőzés és a védőoltás. LAM 2000;10:578-84.
- Siennicka J, Trzcińska A, Rosińska M, Litwińska B. Seroprevalence of varicella-zoster virus in Polish population. Przegł Epidemiol. 2009;63(4):495-9
- Nardone A et al. The comparative sero-epidemiology of varicella zoster virus in 11 countries in the European region. Vaccine. 2007 Nov 7;25(45):7866-72. Epub 2007 Aug 8.

The fourth selection criteria resulted the closest equation with the registered data of HCSO and the National Epidemiology Center, thus following cost-clarifications was made in this patient group.

Inpatient care

Hospitalization was detected by ICD-10 code B01. The maximum presence of hospitalization was found at the first life year (5,0%), but at the second decade hospitalization occurrence increased again up to 3,7% (Figure 1.).

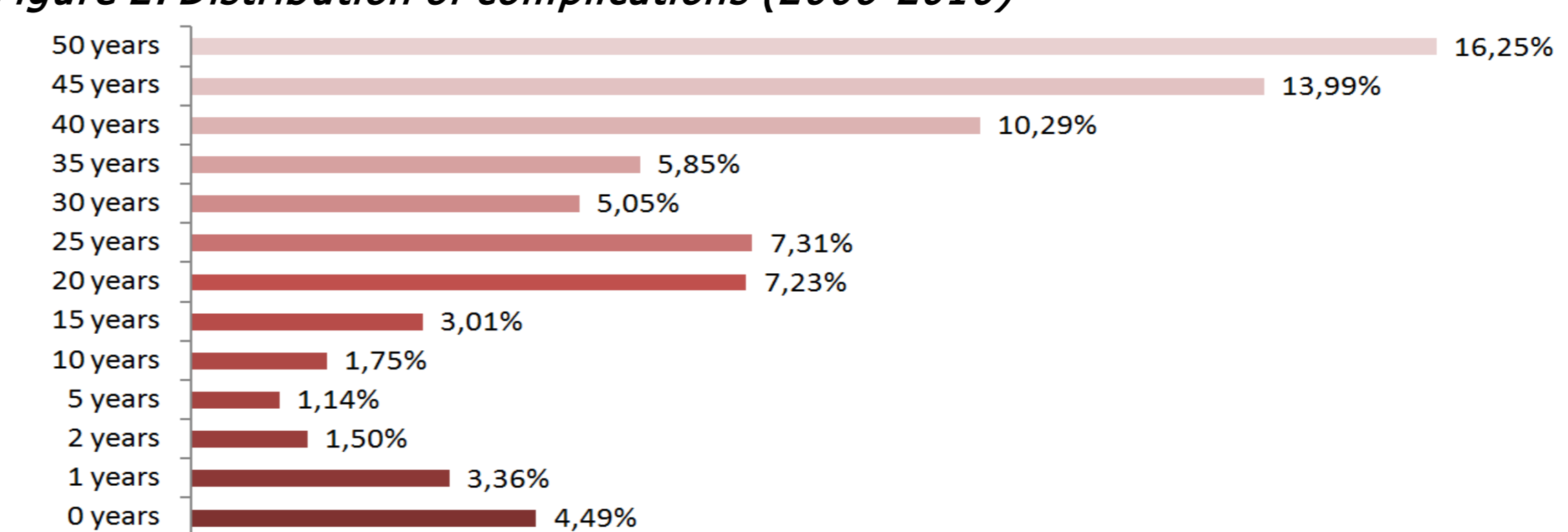
Figure 1. Distribution of hospitalized patients, (2006-2010)



Distribution of patients with neurological and pulmonary complications

During the study period the more often appearance of out- or inpatient care service of meningitis, meningoencephalitis and pneumonia complications was detected after the fourth decade (Figure 2.). More than every tenth of the relevant patients had an in-or outpatient care services during a six years period.

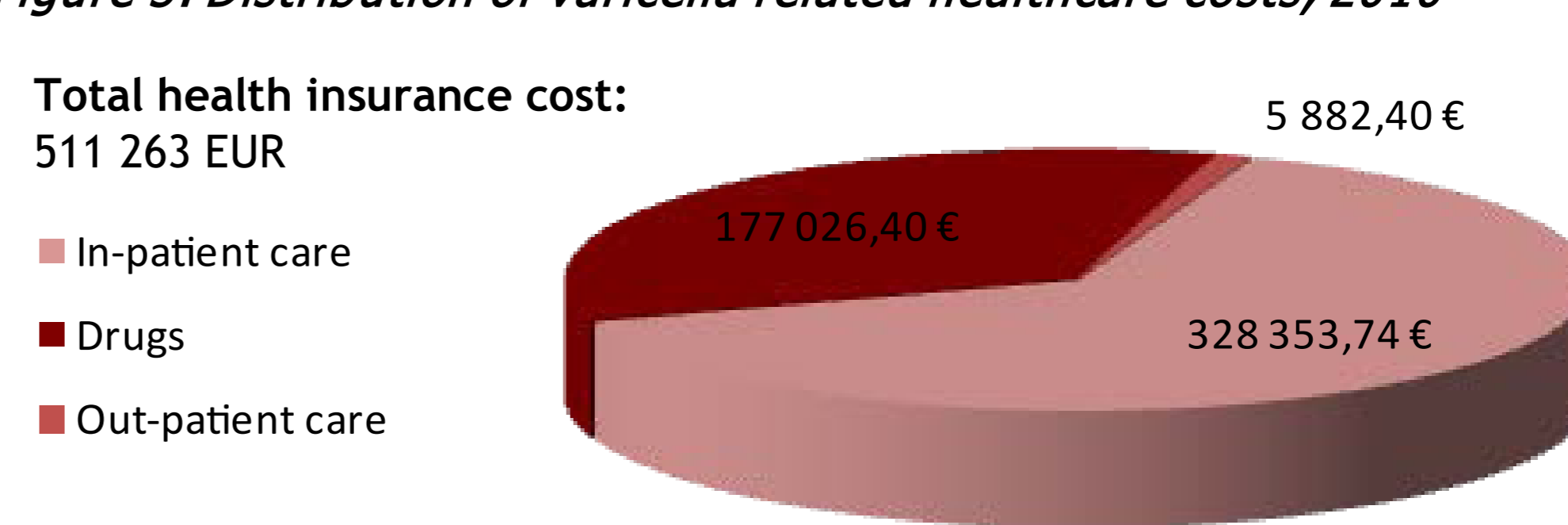
Figure 2. Distribution of complications (2006-2010)



Direct medical costs

The annual healthcare costs per patients and events of the previously presented services were analyzed on the whole data of varicella patient group, and the direct disease burden of varicella was determined from this.

Figure 3. Distribution of varicella related healthcare costs, 2010



The varicella disease resulted 511 263 EUR direct healthcare cost for the financier at 2010. Figure 3 presented the amount of different budget on direct medical costs. Moreover 1,39 million EUR were paid for sickness benefit at 2010.

Results from the questionnaire survey

In Hungary the varicella infection is diagnosed in the majority of the cases (80-90%) by the family pediatricians. A concurring opinions was that the real patient number might be twice or thrice as much as the registered patients number. Varicella vaccination was found effective by Hungarian specialists and confirmed, that the incidence of breakthrough cases is vanishing without hospitalizations or complicated events.

Productivity loss of parents and adult patient has a significant impact, which cause substantial indirect cost burden for the society. An annually indirect cost was declared by the patient numbers of 2010, and by the official (HCSO) employment rate and average gross wage that resulted 1,58 million EUR.

Table 4. Indirect costs

Varicella patient group	Patient number	Proportion of productivity loss**	Cost of productivity loss	Avg duration of productivity loss (day)	Indirect cost
children under 15 years	38 316	49%	3100 HUF/day/person	7	1 362 897 €
number of over 15 year old	2 962	49%		13	195 665 €
Total indirect cost					1 558 562 €

*Estimation for 2010

**Employment rate of the 15-74 year old population in 2009 (HCSO)

CONCLUSION

Our findings highlighted the importance of prevention. The varicella related yearly burden of disease found more than a million EUR at 2010, which does not include the treatment of shingles and the sunk costs of immunosuppressed patients, thus it conservatively underestimates the total disease burden. Only 15% of the costs were belongs to direct medical costs, and significant part of the costs came from indirect cost as productivity loss and sickness benefit. Following research should be undertaken to more precisely estimate the varicella burden of disease, but current results also highlighted that indirect cost have a huge impact in societal perspective.

In most countries pharaco-economic analysis are undertaken from financier perspective per protocol, but among others primer preventions have a significant proportion of savings on indirect cost elements.

Figure 4. Varicella burden of disease in 2010

