

Analysis of the Cost-effectiveness of Varicella Vaccine Programmes Based on an Observational Survey in the Latium Region of Italy

Leonardo Emberti Gialloreti¹, Maurizio Divizia¹, Francesca Pica² and Antonio Volpi¹, ¹Department of Public Health and ²Department of Experimental Medicine and Biochemical Sciences, University of Rome, 'Tor Vergata', Rome, Italy.

KEY WORDS

■ VARICELLA VACCINATION ■ CHICKENPOX ■ VARICELLA ZOSTER VIRUS ■ HERPES ZOSTER ■ COST-EFFECTIVENESS ■ ITALY ■ EUROPE

SUMMARY

Varicella is the most widespread childhood disease in Italy. However, as in many parts of the world, the country does not yet have a unified approach to the management of the disease. A cost-effectiveness analysis of varicella vaccination strategies, using the Latium region in Italy as a case study, was undertaken. Mass vaccination is only recommended if the immunization programme can achieve coverage of over 85% in a short time. However, experience in Italy with non-compulsory vaccinations has shown this is difficult to achieve. Consequently, eradication of the disease is not seen as an attainable short-term goal. For mass varicella vaccination to be successful, it must be run at a national as well as regional level in combination with education programmes, and a reliable surveillance system. The interaction between varicella and herpes zoster must also be taken into account when considering vaccination strategies, as zoster vaccination strategies may have an impact on varicella coverage.

Introduction

VARICELLA, OR CHICKENPOX, is the most widespread childhood disease in Italy, continuing to show an endemic/epidemic trend. A live attenuated varicella vaccine was licensed in the USA in 1995¹ for universal immunization and in Italy in 2001.² It appears to be safe, well tolerated³ and highly immunogenic, with seroconversion rates ranging from 94% to 100%.⁴ The implementation of wide vaccination programmes in the USA significantly reduced the incidence of varicella.⁵ In Europe, a recent statement recommends routine vaccination of healthy children between 12 and 18 months and of susceptible teenagers before their 13th birthday.⁶ Nevertheless, the most appropriate management of the disease continues to be a divisive issue.⁷

The Sicilian region of Italy began mass infant and adolescent vaccination against varicella in 2002, becoming one of the first districts in Europe to carry out such a strategy. According to some coordinators of the programme, the goal of intervention should be to reduce the incidence of chickenpox, to induce savings of direct and indirect costs from both societal and health-system perspectives and, eventually, to eradicate varicella.⁸ However, the Italian Parliamentary Commission for Childhood expressed some doubts about this decision of the Sicilian health authorities.⁹ The concerns were mainly related to the uncertain and not easily predictable results of such a programme. In

fact, the spreading of infectious diseases in a population is a complex process, which becomes even more complicated by the introduction of a vaccine.

Nevertheless, there are instruments that can help to identify the best and most cost-effective vaccination strategies. In Italy, as well as in Europe, with regard to varicella vaccination, we are, *de facto*, still in a pre-vaccination period. That is why there is the chance of making best use of both the experience of the USA, and of the several mathematical models which have been developed to evaluate the impact of introducing mass vaccination.¹⁰⁻¹⁵

Although there are some differences between the various mathematical models, all agree that, after introduction of extensive vaccination, one or more epidemic peaks follow an initial decrease of chickenpox case frequency. Case frequency should, in fact, decrease during the first 3-5 years, followed by epidemic peaks. Furthermore, several models stress that a decrease in cases among infants could be accompanied by an increase in cases among adults, if this event is not minimized by high vaccination coverages undertaken over a short time-period. The implementation of a vaccination strategy without achieving coverage that is able to interrupt the epidemiological transmission chain could lead to a case reduction without eliminating the endemic nature of chickenpox – as has already happened in Italy with measles. In fact, although a vaccine against measles has been available in Italy for 20 years, coverage continues to be sub-optimal. Consequently, the virus has not been eradicated, and the age of maximal incidence of the disease has been postponed, in addition to a higher frequency of complications.¹⁰ Many authors have stressed that a non-coordinated and only partially implemented vaccination strategy may have an effect on age of infection and, consequently, give rise to higher social and individual costs,¹¹ mainly due to the increase in complicated varicella cases.⁶

The several cost-effectiveness analyses and mathematical methods of varicella vaccination have focused mainly on the consequences to varicella itself.⁷ However, as is already known, reactivation of latent varicella zoster virus (VZV) can also cause herpes zoster. Some studies have recognized that exposure to varicella might reduce the risk of zoster by boosting specific immunity to VZV.^{12,13} That is why some authors, based on mathematical modelling, have foreseen that a decreased circulation of VZV caused by mass vaccination could lead to an increase in zoster, lasting up to 60 years.¹⁴ Therefore, before making a decision on an intervention strategy of varicella vaccination, it is also necessary to take into account its possible consequences on the development of zoster. A cost-utility analysis based on this assumption has been

performed for England and Wales.¹⁵ Some of these results appear to be applicable to the Italian circumstances, particularly because the over-60 age group, being the most affected by zoster, is strongly represented in Italy.¹⁶

The present analysis utilizes the available literature on cost-effectiveness of varicella vaccination, applying it to the actual situation of the Latium region of Italy. Our group has previously published the results of an observational study on paediatric varicella in the region.¹⁷ The hypotheses of the present study rest also on the results of our previous one. We wanted to undertake a simple and easily applicable cost-effectiveness analysis, which may assist healthcare providers in choosing the most appropriate varicella vaccination strategy. It is worthwhile noting that the Latium region has some demographic patterns similar to those of Sicily, particularly the total population (5 205 139 versus 5 003 262) and the number of live-born (50 490 versus 51 899).¹⁶ However, it should also be stressed that the Sicilian population is younger than that of Latium.

Varicella

In Italy, varicella is subject to statutory notification. However, as a country it experiences a high level of under-reporting.¹⁸ It is therefore necessary to assess the degree of under-reporting, as it may hamper the accurate evaluation of the potential impact of a vaccination strategy. In the Latium region the number of officially reported cases was 4316 for 2002 (latest definitive available data).¹⁹ A national network, coordinated by the Italian *Istituto Superiore di Sanità*, provides probably the most reliable approximation of the actual incidence of chickenpox among children (0–14 years) in Italy.²⁰ Using these incidence rates, increased by 15% in order to adjust them to the Latium situation, we estimated the number of child varicella cases per year at 34 250. Furthermore, knowing that in Italy the seroprevalence of VZV is about 80% by 14 years of age,²¹ we put the number of adult varicella cases (15 years and over) at 8560 per year. Consequently, the total number of yearly chickenpox cases in Latium should be approximately 43 000.

To assess the cost of one case of illness, it is necessary to consider both the direct and indirect costs. The direct costs include prescribed medications, physician contacts and possible hospitalizations. The indirect costs include the work-loss costs and household expenditures. In order to estimate the cost of one case of paediatric varicella, we utilized our sample of 1094 subjects affected by chickenpox, who originated from a population of approximately 50 000 children.¹⁷ The treatments prescribed to the 1094 subjects are shown in Table 1.

Table 1: Medication prescribed to 1094 children with varicella in the Latium region of Italy between September 1998 and May 1999¹⁷

Treatment	No. of patients	%
Antihistamines	699	64
Antipyretics	288	26
Aciclovir	550	50
Antibiotics	125	11

It has been estimated that the average number of physician contacts per case of paediatric varicella is 1.3.²² As in Latium, the average cost of one medical examination of a general practitioner can be quantified as €15.00, the cost per single child varicella case is €19.50. With respect to adults, other authors have put the

physician contact cost for one varicella case at €15.00.²³

To assess the costs of prescribed medications, we based our estimates on the Italian *Prontuario Farmaceutico Nazionale*.²⁴ The average cost for one course of antihistamines is €5.20, for antipyretics €3.30, for antibiotics €3.80 and for aciclovir €20.20. In the clinical situation each patient is likely to receive a combination of therapies. The typical estimated costs of this approach, calculated in relation to the percentage of children who actually receive each therapy, are given in

Table 2: Unit costs for treating varicella in the Latium region of Italy. Based on a study of 1094 children with varicella treated in the Latium region of Italy between September 1998 and May 1999¹⁷

	Patients using the medicine (%)	Unit cost (€)
Antihistamines	64	3.30
Antipyretics	26	0.90
Aciclovir	50	10.10
Antibiotics	11	0.40
TOTAL		14.70

Table 2. With adults, we assumed that approximately the same kinds of prescribed drugs are utilized, but we added €10.00 because of the more frequent use of antivirals and other medicines. So, the unit cost of the treatment of one adult varicella case is €24.70.

According to the Italian database of hospital discharges (*Schede di Dimissione Ospedaliera*),²⁵ 117 children and 145 adults were hospitalized in Latium in 2002 because of chickenpox (latest definitive available data). The hospitalization rate can, therefore, be approximated at 0.3% among children and at 1.7% among adolescents and adults. The average cost of one hospital admission for varicella, according to the DRG (Diagnosis Related Groups) system of Latium, is €2050.²⁶ Consequently, the hospitalization cost of one case of child varicella can be put at €7.00 and the cost of one case of adult varicella at €34.70.

The work-loss costs have been valued to be between €86.00 and €124.00 per day in Italy.^{23,27} We also factored in possible household expenditures, increasing the estimated cost of 1 day of work loss to €128.00. According to our sample, 10.2% of the parents lost working days to care for their sick children. Therefore, the average number of lost working days is 0.6, putting the cost of each working day lost for paediatric cases at €76.80. With regard to adults, according to a French study, the mean number of lost working days for a worker due to varicella is 11.²⁸ As only 50% of the patients were working, the average number of lost working days should be estimated at 5.5, leading to a unit work-loss cost of €704.00.

The combined cost of one varicella case is shown in Table 3. We can quantify the overall cost of one child varicella case to be €118.00 and of one adult case to be €778.40. Assuming in Latium 34 250 paediatric varicella cases and 8560 adult varicella cases per year, we can estimate costs of child and adult varicella respectively of €4 041 500 and €6 663 104. The high costs of adult varicella are due mainly to lost working days. So, the overall yearly cost of varicella in Latium is €10 704 604.

Herpes Zoster

The incidence of herpes zoster ranges between 1.3 and 4.8 cases/1000 per year.^{29,30} A study conducted in Italy involving people of at least 15 years of age calculated an incidence of 4.14 cases per 1000 people.³¹

Table 3: Calculation of the overall cost of one varicella case in the Latium region of Italy

	Children (€)	Adults (€)
Direct costs		
Treatment	14.70	24.70
Physician contacts	19.50	15.00
Hospitalization	7.00	34.70
Indirect costs	76.80	704.00
TOTAL	118.00	778.40

Assuming this incidence, and knowing that in Latium 86.1% of the total population is older than 14,¹⁶ the number of people aged at least 15 years affected by shingles should amount to 18 347 per year. The mean length of the disease is 15 days³¹ and 44% of the patients were still working. Applied to Latium, it means that 8072 persons affected by shingles should be workers. Therefore, the unit work-loss cost is about €845.00. Four hundred and ninety six hospital admissions due to zoster were registered in Latium in 2002.²⁵ The average cost of one hospital admission for herpes zoster in Latium is €2800.00.²⁶ Consequently, the hospitalization cost of one case of zoster can be put at about €76.00. On average, there are 1.5 physician contacts per case of shingles,³¹ leading to an estimate of €22.00 for the cost of medical examination per single shingles case. Nearly all patients are treated with antivirals, increasing the cost of medications, which we estimated at €44.00. Table 4 shows the combined cost of one shingles case. The overall cost of one herpes zoster case is €987.00. Therefore, the cost of herpes zoster in Latium can be estimated at €18 108 489, an amount which is significantly higher than that for varicella, without considering the few paediatric or long-lasting postherpetic neuralgia cases, particularly among the elderly, which amount to 5–10% of all zoster cases.³² This means also that a relatively small increase in cases of zoster could lead to a significant increase in societal and health-system costs.

Table 4: Calculation of the overall cost of one herpes zoster case in the Latium area of Italy

	Cost (€)
Direct costs	
Treatment	44.00
Physician contacts	22.00
Hospitalization	76.00
Indirect costs	845.00
TOTAL	987.00

Varicella Vaccination

To evaluate the costs of vaccination, we put, by default, the unit cost at €82.00, i.e. the official cost of the vaccine itself, without taking into account other possible direct or indirect expenses. The vaccination programme which is being implemented in Sicily is a combination of infant strategy (routine mass infant vaccination at 90% coverage) and adolescent strategy (vaccination of 11 year old susceptibles at 80% coverage). This strategy would vaccinate 45 441 children (90% of the live-born) and 9120 adolescents¹⁶ (80% of all susceptible 11 year olds, which, according to some studies, corresponds to 22.8% of this age

group³³) in Latium annually. So, the number of people who should be vaccinated yearly is 54 561. Therefore, the overall cost of a vaccination programme can be estimated at €4 474 002 per year.

Five-year long varicella vaccination experience in the USA showed a 71–84% decrease in chickenpox cases.⁵ Assuming a similar trend also in Latium we should expect about 9050 residual varicella cases after implementation of the vaccination programme, 1800 of whom are adults. We used here the already estimated unit cost per varicella case, with the exclusion of the hospitalization costs, as the US experience shows a strong decrease in complications. The computed unit costs are therefore €111.00 for a child case and €743.70 for an adult case. The overall cost of the residual varicella cases can be put at €2 143 410. The total cost of this vaccination programme and of the leftover varicella cases is therefore €6 617 412.

According to all these assumptions, the vaccination programme would induce, in the short and medium terms, savings of €4 087 192 a year, or 38.2% of the present costs of varicella.

Discussion

The aim of this analysis was to determine the maximum theoretical savings which could be obtained in the short and medium terms through a well-implemented vaccination programme in a region such as Latium. That is why we have focused on the strategy recognized as the most effective by the majority of health providers and recommended at a European level,⁶ leaving aside other policies.¹¹ In fact, while conducting the present study, we willingly adopted a 'pro-vaccine' attitude, maximizing the pros and minimizing the cons. Therefore, when analysing the vaccination costs, we did not take into account possible varicella breakthrough cases and adverse effects, which do not at any rate outweigh the benefits,³⁴ nor implementation, physician or nursing costs or a boosting dose of vaccine. This is because in Italy at present, as opposed to the current US situation, a second dose of vaccine is not recommended by public health officials. We also did not take into consideration epidemic peaks, which can follow an initial decrease of case frequency, even if these have been highlighted by several studies.^{15,18} On the contrary, the costs of each varicella case in the pre-vaccination period have been overestimated. This means that, in practice, savings will probably be lower than the ones presented here. It should also be added that if the programme does not succeed in achieving a wide coverage in a short time, remaining at a sub-optimal level, the shift of varicella cases towards older ages could further shrink the cost-effectiveness of the vaccination and increase the risk of complications. It is noteworthy to mention that this has already happened in Italy with measles vaccination, and that in Italy both measles and varicella vaccination are recommended, but not compulsory.

Furthermore, we assumed that after vaccination there would not be any deleterious effect on the occurrence and severity of herpes zoster. However, by means of mathematical modelling, it has been shown that the long-term cost-effectiveness of varicella vaccination depends strongly on the impact it will have on zoster.¹⁵ A possible rise in zoster morbidity, estimated through modelling to be about 6%, lasting for up to 60 years, could offset the benefits of varicella vaccination, both in crude financial terms, and in lost quality adjusted life years.

This means that to undo the financial savings in our study, zoster cases would need to increase by an unlikely 23%. On the other hand, it should be noted that some data support the theory that vaccination itself may prevent herpes zoster, a possibility not foreseen by the mathematical modelling. Finally, Oxman *et al.*³⁵

recently have shown clearly that a varicella vaccine, containing several times the amount of virus used in child immunization, has significantly decreased shingles cases in adults of 60 years of age or older.

Conclusions

The present study applied data on varicella vaccination available in literature to the actual situation of the Latium region of Italy. Obviously, our study cannot give a definitive and all-inclusive answer as to whether varicella vaccination is cost-effective or not. However, some conclusions, which are useful in identifying the most appropriate long-term cost-effective strategies for Italy, can be drawn.

A mass vaccination policy should be recommended only if the immunization programme is able to achieve a high coverage (over 85%) in a short time. This means that the implementation of the programme should be well planned, structured and coordinated at a public health level, avoiding undertakings which are incoherent with the global planning. Making a tetravalent vaccine (measles–mumps–rubella–varicella) available in a short time could enhance the possibilities of achieving a high coverage. However, in Italy, the coverage of non-compulsory vaccinations, like measles, has not been homogeneous throughout the country. It is therefore difficult to foresee high varicella vaccination coverage in the short term. Furthermore, wide-ranging educational health campaigns are a must before undertaking a vaccination programme.

The eradication of varicella does not appear to be a goal that can be achieved and realized in the short term. That is why a mass varicella vaccination strategy should be coordinated at a national and not only at a regional level, as the mobility of the population could thwart the development of the herd immunity effect, negating the efficacy of the programme. In fact, herd immunity plays an important role in the significant decrease of varicella incidence following a vaccination programme.⁵

The US experience shows also that, when beginning a vaccination campaign, it is also necessary to develop a reliable surveillance system, which should be suitable for registering possible adverse reactions to the vaccine. Surveillance is a fundamental instrument in

order to determine the impact of the programme, to evaluate the necessity of implementing new strategies, and to ascertain if and why at a certain moment the incidence of the disease does not continue to decrease. Only a continued long-term follow-up will be able to determine how varicella vaccination will influence the epidemiological development of chickenpox and shingles.

The short- and long-term consequences of herpes zoster should always be considered before beginning a mass varicella vaccination programme. The combined infant vaccination and vaccination of 11-year-old susceptibles appears to have little effect both on the age at infection and on incidence of shingles. However, this positive result will be achieved only if a high coverage is attained in a short time. Another, possibly more cost-effective, option from the health provider's point of view could be to submit to routine vaccination only the 11-year-old susceptibles. This strategy would greatly enhance the possibility of achieving high coverage rates and, at the same time, significantly reduce the number of serious diseases. This option would have only modest consequences on the age at infection and on the cases of zoster.¹⁵ As the zoster vaccine trial proved to be able to reduce the incidence and/or the severity of the disease and of post-herpetic neuralgia,³⁵ then another future strategy could be to vaccinate children against varicella and adults against zoster.

Conflicts of Interest

No conflicts of interest were declared in relation to this article.

Address for correspondence:

Dr Maurizio Divizia, Department of Public Health, University of Rome, 'Tor Vergata', Via Montpellier 1, 00133, Rome, Italy.

E-mail: divizia@med.uniroma2.it

Received for publication: 25 May 2005

Accepted for publication: 14 July 2005

REFERENCES

1. Recommendations for the use of live attenuated varicella vaccine. American Academy of Pediatrics Committee on Infectious Diseases. *Pediatrics* 1995; **95**:791–796.
2. Verani P, Ciufolini MG. Pharmaceutical development of varicella vaccine Oka-Merck (in Italian). *Ann Ig* 2002; **14**(Suppl 6):45–50.
3. Vazquez M, LaRussa PS, Gershon AA, Steinberg SP, Freudigman K, Shapiro ED. The effectiveness of the varicella vaccine in clinical practice. *N Engl J Med* 2001; **344**:955–960.
4. Arvin AM. Varicella vaccine: genesis, efficacy, and attenuation. *Virology* 2001; **284**:153–158. No abstract available.
5. Seward JF, Watson BM, Peterson CL, Mascola L, Pelosi JW, Zhand JX *et al*. Varicella disease after introduction of varicella vaccine in the United States, 1995–2000. *JAMA* 2002; **287**:606–611.
6. Rentier B, Gershon AA, European Working Group on Varicella. Consensus: varicella vaccination of healthy children – a challenge for Europe. *Pediatr Infect Dis J* 2004; **23**:379–389.
7. Thiry N, Beutels P, Van Damme P, Van Doorslaer E. Economic evaluations of varicella vaccination programmes: review of the literature. *Pharmacoeconomics* 2003; **21**:13–38.
8. Medinews. Agenzia di Stampa Socio-Sanitaria (in Italian). Available at: www.medinews.it/files/index.cfm?id_rst=53&id_elm=2429. Last accessed 26 July 2005.
9. Commissione parlamentare per l'infanzia. Indagine conoscitiva sulla copertura vaccinale in età pediatrica e sull'ospedalizzazione dei bambini affetti da malattie infettive. Documento conclusivo approvato dalla commissione (in Italian). 16 settembre 2003. Available at: www.camera.it/_dati/leg14/lavori/bollet/200309/0916/html/36comunic.htm. Last accessed 26 August 2005.
10. Gabutti G, Rota MC, Salmaso S, Bruzzone BM, Bella A, Crovari P *et al*. Epidemiology of measles, mumps and rubella in Italy. *Epidemiol Infect* 2002; **129**:543–550.
11. Germinario C, Lopalco PL, Prato R, Quarto M. Target of the varicella vaccination (in Italian). *Ann Ig* 2002; **14**(Suppl 6): 55–58.
12. Brisson M, Gay NJ, Edmunds WJ, Andrews NJ. Exposure to varicella boosts immunity to herpes-zoster: implications for mass vaccination against chickenpox. *Vaccine* 2002; **20**:2500–2507.
13. Thomas SL, Wheeler JG, Hall AJ. Contacts with varicella or with children and protection against herpes zoster in adults: a case-control study. *Lancet* 2002; **360**:678–682.
14. Brisson M, Edmunds WJ, Gay NJ. Varicella vaccination: impact of vaccine efficacy on the epidemiology of VZV. *J Med Virol* 2003; **70**(Suppl 1): S31–S37.
15. Brisson M, Edmunds WJ. Varicella vaccination in England and Wales: cost-utility analysis. *Arch Dis Child* 2003; **88**:862–869.
16. Istituto Nazionale di Statistica. Annuario Statistico Italiano 2004 (in Italian). Roma 2004. pp29–56.
17. Volpi A, Gentile G, Pica F, Suligoi B, for the SLAVIP Study Group. Antiviral treatment of varicella in pediatric practice in the Latium region of Italy: results of an observational study. *Pediatr Infect Dis J* 2002; **21**:739–749.
18. Salmaso S, Mandolini D, Scalia Tomba G, Esposito N. Prevention of varicella in Italy: Vaccination strategies (in Italian). *Ann Ig* 2002; **14**(Suppl 6):35–44.
19. Ministero della Salute. Available at: www.ministerosalute.it/promozione/malattie/bollettino.jsp (in Italian). Last accessed 26 July 2005.
20. Ciofi Degli Atti ML. Sentinel Pediatric Surveillance in Italy: Results from 2000. BEN Notiziario ISS 2001; **14**. Available at: www.ben.iss.it/

- precedenti/maggio/3may_en.htm. Last accessed 26 July 2005
21. Ciofi Degli Atti ML, Rota MC, Salmaso S, Mandolini D, Bella A, Carbonari P *et al.* Monitoring varicella incidence in Italy (in Italian). *Ann Ig* 2002; **14**(Suppl 6):11–19.
 22. Fornaro P, Gandini F, Marin M, Pedrazzi C, Piccoli P, Tognetti D *et al.* Epidemiology and cost analysis of varicella in Italy: results of a study in the paediatric practice. *Pediatr Infect Dis J* 1999; **18**:414–419.
 23. Zotti CM, Maggiorotto G, Migliardi A. Costs of varicella (in Italian). *Ann Ig* 2002; **14**(Suppl 6):29–33.
 24. Ministero della Salute. Il Nuovo Prontuario Farmaceutico Nazionale (in Italian). Roma, 2003.
- Available at:
www.ministerosalute.it/imgs/C_17_bif_editoriale_5_listaFile_itemName_O_file_Pdf.pdf. Last accessed 26 August 2005.
25. Ministero della Salute. Statistiche sui ricoveri ospedalieri (in Italian). Available at:
www.ministerosalute.it/programmazione/sdo/ric_informazioni/default.jsp. Last accessed 26 July 2005.
 26. Giunta Regionale del Lazio. Finanziamento del livello assistenziale ospedaliero per l'anno 2002. 21/12/2001. Deliberazione 2047 (in Italian).
 27. Ludioni C, Ciriminna S, Mazzi S, Moiraghi Ruggenini A, Serra G, Soncini R. Measles vaccination policy in Palermo (Sicily) in the middle nineties: a cost-benefit evaluation. *J Prev Med Hygiene* 2000; **41**:1–12.
 28. Coudeville L, Parea F, Lebrun T, Saily J. The value of varicella vaccination in healthy children: cost-benefit analysis of the situation in France. *Vaccine* 1999; **17**:142–151.
 29. Ragozzino MW, Melton LJ, Kurland LT, Chu CP, Perry HO. Population-based study of herpes zoster and its sequelae. *Medicine* (Baltimore) 1982; **61**:310–316.
 30. Glynn C, Crockford G, Cavaghan D, Cardno P, Price D, Miller J. Epidemiology of shingles. *J R Soc Med* 1990; **83**:617–619.
 31. Di Luzio Papparatti U, Arpinelli F, Visonà G. Herpes zoster and its complications in Italy: an observational survey. *J Infect* 1999; **38**:116–120.
 32. Bowsher D. The lifetime occurrence of herpes zoster and prevalence of post-herpetic neuralgia: a retrospective survey in an elderly population. *Eur J Pain* 1999; **3**:335–342.
 33. Romano L, Grilli G, Zanetti AR. Seroepidemiology of varicella in a cohort of Italian adolescents (in Italian). *Ann Ig* 2002; **14**(Suppl 6):7–10.
 34. Gershon AA. Varicella vaccine: rare serious problems – but the benefits still outweigh the risks. *J Infect Dis* 2003; **188**:945–947.
 35. Oxman MN, Levin MJ, Johnson GR, Schmader Strauss SE, Gelb LD *et al.* A vaccine to prevent herpes zoster and postherpetic neuralgia in older adults. *N Engl J Med*. 2005; **352**:2271–2284.

Cost-effectiveness of Varicella Vaccine • **HERPES** 12:2 2005

Why you should participate at the 12th Annual Meeting of the IHMF®



Venue: Corinthia Alfa Hotel, Lisbon, Portugal, 28–30 October 2005

One of the primary aims of the IHMF® is to develop international recommendations and guidelines on the management of herpesvirus infections. The Annual Meeting provides the opportunity for these recommendations to be formulated and debated at an international level. **Your input at this meeting is, therefore, important and can have a wide-reaching impact.**



Key features of this year's IHMF® Annual Meeting:

- **Feedback and discussion** from the IHMF® workshop on the current and future **management of zoster**, focusing on the use of antiviral therapy for varicella and herpes zoster and the challenge of post-herpetic neuralgia
- Lively **Plenary Debate** on the pros and cons of universal varicella immunization
- **Clinical Case History Sessions**
- **Poster Symposium**

***Keynote lectures** focus on CMV Vaccine Potential, Topical Antiherpes Therapies, Implications of New Data from Ongoing Varicella Vaccine Trials, Managing HSV in HIV-infected Patients, Public Health Issues in HSV Infection and the Frequency of HSV Shedding

Attend the Annual Meeting and debate the proposed recommendations – make your opinion count.

How to register for the 12th Annual Meeting of the IHMF®

Contact the Secretariat at ihmf@hbase.com or visit www.IHMF.org. This website contains detailed information on the meeting, and an on-line registration facility.

IHMF® Secretariat Contact Details

MMS House, 3 Liverpool Gardens, Worthing, West Sussex, BN11 1TF, UK.

Telephone: +44 (0)1903 288114; Fax: +44 (0)1903 288257. E-mail: ihmf@hbase.com, www.ihmf.org

12th Annual Meeting of the IHMF®

Focus on the Future