

tiveness and cost-benefit of PCV-7 vaccination which were used to identify and assess additional value determinants specific to PCV-7. **RESULTS:** Recent health economic evaluations of PCV-7 have resulted in cost-effectiveness ratios similar to those for currently accepted health interventions. PCV-7 vaccination would help Canadians avoid substantial morbidity and mortality and as a consequence significant quantifiable healthcare costs and productivity losses for meningitis, bacteremia, pneumonia, otitis media and myringotomy estimated at \$63 million. However, the following value health outcomes and improvements are difficult to quantify in monetary terms: lives saved, reduced morbidity and costs of treating other pneumococcal-related diseases, emotional stresses and improved productivity of parents, the impact of herd immunity and reduced antimicrobial resistance. **CONCLUSION:** Post-licensure studies on changes in the disease trends and epidemiology of pneumococcal disease are required to monitor the “real world” impact and success of a universal PCV-7 vaccination program. Vaccination with PCV-7 appears to be a potentially cost-effective health intervention and may in fact generate cost-savings when qualitative assessments of value-added health improvements are considered.

#### INFECTION—Economic Outcomes

#### PIN 18

##### INFLUENZA VACCINATION IN A MALAYSIAN COMPANY: WHAT RETURN ON INVESTMENT FOR THE EMPLOYER?

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**OBJECTIVE:** To evaluate the influenza vaccination health (decrease of attack rates of influenza-like-illness (ILI)) and economic (work productivity and indirect costs avoided) benefits in a company setting, using the employer perspective. **METHODS:** A prospective, non-randomised, non-placebo cost-benefit study was conducted in a petrochemical plant in Malaysia, comparing 2 cohorts: the influenza vaccinated (volunteers) and not vaccinated subjects. Influenza vaccination took place between 15th March and 15th April 2001 with a follow-up period of 6 months. Socio-economic and health status information, data on ILI symptoms and sick leaves were collected through self-administered monthly questionnaires, whereas vaccines' adverse events were reported one week after injection. Immunization benefits were calculated through the avoided absenteeism, itself valued by replacement costs, individual operating income and wages. Costs of vaccination covered the vaccine administration and its adverse events. Loss of productivity was assessed by sick leave days and days of reduced effec-

tiveness at work due to being not well because of ILI. **RESULTS:** Among the 504 vaccinated and 518 not-vaccinated subjects, the attack rates of ILI were respectively, 8.13% and 30.31% with presence of fever in 100% of the reported ILI cases. The average length of sick leave taken for ILI was significantly greater in the not-vaccinated cohort ( $4.22 \pm 1.39$  vs  $3.00 \pm 0.98$ ) as well as the number of days until feeling well again ( $5.80 \pm 0.85$  vs  $5.37 \pm 0.58$ ). With an effectiveness of 77.98% in avoiding absenteeism, influenza vaccination lead to a global cost-savings of US\$ 357,955 and a cost-savings of US\$ 710 per vaccinated employee, when considering the realistic hypothesis of a 30% reduced productivity when the patient is not well because of ILI. **CONCLUSIONS:** Influenza vaccination showed an important effectiveness in reducing the number of ILI episodes but also indirect costs, leading to high return on investment for the employer.

#### PIN 19

##### ROUTINE CHILDHOOD VACCINATION AGAINST INFLUENZA: AN ANALYSIS OF CLINICAL AND ECONOMIC BENEFITS

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**OBJECTIVE:** Influenza illness rates are high among children; they also are a major pathway for disease transmission to adults. Routine vaccination of children against influenza therefore may prevent not only their own illness, but also that of others in the community. The objective of this study was to estimate the clinical and economic benefits of such a policy, which are currently unknown. **METHODS:** We developed a stochastic simulation model of infection, disease transmission, clinical illness, and economic costs to assess the population-wide impact of routinely vaccinating children (ages 1–18 years) against influenza. The model depicts the daily interaction of persons in the population in various “mixing” groups (e.g., households, playgroups, schools), and simulates the spread of influenza infection throughout the community and the resulting number of illnesses; associated medical care (direct) and work loss (indirect) costs also are estimated. We used the model to examine the impact of expanded childhood vaccination (40%, 60%, and 80% coverage alternatively) versus current practice (5% coverage) on US influenza-related morbidity, mortality, and economic costs. In all scenarios, adults were assumed to receive influenza vaccine at current US rates. Vaccine efficacy was assumed to be 70%. **RESULTS:** In the US, there are currently an estimated 31.5 million cases of influenza illness annually, resulting in 119,000 hospitalizations, 11.8 million outpatient visits, \$2.3 billion in direct costs, and \$9.5 billion in indirect costs. Routine vaccination of 60% of children would reduce the population-wide

burden of influenza by 79–85%. Estimated direct cost savings (excluding the cost of vaccination) would be \$47 per vaccinated child; indirect cost savings would be \$199 per vaccinee. Assumed coverage levels of 40% and 80% yielded similar findings. **CONCLUSIONS:** Routine vaccination of children and the resulting reduction in disease transmission would reduce substantially the clinical and economic burden of influenza in the US.

**PIN20**

### **COST-CONSEQUENCES OF INFLUENZA VACCINATION FOR SCHOOL-AGED CHILDREN IN JAPAN**

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Although influenza vaccination had been performed on mandatory basis for Japanese school-aged children until the mid of 1980s, thereafter the government changed the policy into individual-initiated basis. It caused the recipient rate of influenza vaccination rapidly decreasing. Consequently, there emerged a controversy about vaccination policy, mandatory vs. voluntary, for high-risk population. **OBJECTIVE:** Evaluate cost-consequences of the controversial strategies for influenza vaccination compared with no vaccination for healthy school-aged children in Japan. **METHODS:** A cost-consequence analysis was performed by decision analytic modeling using data from the literature. The decision tree models a healthy school-aged child facing the alternatives toward influenza: 1) individual-initiated voluntary vaccination; 2) mandatory vaccination in school; or 3) no vaccination. Direct costs included medical costs for vaccination (the costs of the vaccine, supplies, personnel, etc.), physician visits, and treatments. Also, indirect costs were included in the form of lost productivity in which the parents are burdened by taking children to a physician's office for vaccination or staying home to care for their ill children. The total cost of each scenario was compared with that of no vaccination consequence. We assumed the vaccine has no side effects for the base case, and then a sensitivity analysis was conducted to evaluate the impact of side effects with low-grade fever. **RESULTS:** Performing mandatory vaccination could save US\$13 (JY1571) per child vaccinated comparing with no vaccination, whereas voluntary vaccination additionally cost US\$36 (JY4428). Also, the total cost of mandatory scenario had an advantage of marginal saving of US\$50 (JY6000) comparing to the voluntary basis. The sensitivity analysis indicated that results in the base case were rather robust. **CONCLUSION:** Mandatory vaccination for children in Japanese school could have substantial cost savings. Considering the target population of 18,000,000 school children in Japan, turning into mandatory is recommended with great potentiality of economic impact on the society.

**PIN21**

### **COST-EFFECTIVENESS OF SELECTED INTERVENTIONS TO REDUCE THE BURDEN OF CHILDHOOD PNEUMONIA AND DIARRHEA: A STANDARDISED ANALYSIS**

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**OBJECTIVES:** The World Health Report 2002 attributes 15% of the burden of disease associated with major risk factors in developing countries to malnutrition and about 3% each to Vitamin A and zinc deficiency. Most of the burden is from diarrhea and pneumonia in children aged less than five years. This paper analyses the costs and effectiveness of selected personal and non-personal curative and preventive interventions, singly and in combination. **METHODS:** For each of 11 epidemiological subregions, the population health impact for each intervention or combination of interventions at different levels of coverage has been evaluated using a state transition model. Efficacy data come from systematic reviews or evaluations. Costs are estimated using the standardized WHO ingredients approach. An intervention is considered cost-effective if the cost-effectiveness ratio is <3 GDP per capita for the subregion. **RESULTS:** The highest health gains from a single intervention are from case management for pneumonia and oral rehydration therapy. The lowest costs are with fortification with Vitamin A and zinc. Cost-effectiveness ratios cluster in three groups with fortification with zinc and Vitamin A as the most cost-effective, and provision of supplementary food and nutrition counseling as the least cost-effective. In between are oral rehydration therapy, case management for pneumonia and Vitamin A and zinc supplementation. **CONCLUSIONS:** On the grounds of cost-effectiveness, Vitamin A and zinc fortification or supplementation should be considered for routine provision, together with oral rehydration therapy and case management for pneumonia.

**PIN22**

### **TELITHROMYCIN (TEL) IS AN EFFECTIVE THERAPY FOR ADULT OUTPATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA (CAP) AND IS ASSOCIATED WITH LOWER OVERALL HEALTHCARE COSTS THAN CLARITHROMYCIN (CLA): A POOLED ANALYSIS OF DATA FROM TWO INDEPENDENT, RANDOMIZED, DOUBLE-BLIND STUDIES**

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**OBJECTIVES:** To compare the clinical and economic impact of oral TEL and CLA in adult outpatients with