

CV3

IMPACT OF CARVEDILOL ON INPATIENT RESOURCE USE AND COSTS IN HEART FAILUREVera-Llonch M¹, Oster G¹, Lukas M², Fowler M³, for the U.S. Carvedilol Heart Failure Study Group¹Policy Analysis Inc., Brookline, MA, USA; ²SmithKline Beecham Pharmaceuticals, Philadelphia, PA, USA; ³Stanford University School of Medicine, Stanford, CA, USA

OBJECTIVE: To examine the impact of carvedilol on the utilization and cost of inpatient care in patients with chronic heart failure. **METHODS:** A health-economic evaluation of carvedilol was undertaken in conjunction with the US Carvedilol Heart Failure Trials Program, in which 1094 patients with NYHA Class II–IV heart failure were randomized to treatment with carvedilol or placebo (696 and 398 respectively) as an adjunct to conventional therapy (digitalis, diuretics, ACE inhibitors). Patients were treated for up to 15 months (mean = 6.5 months). Measures of interest included the numbers of hospitalizations, days spent in special-care units and in hospital overall, the utilization of selected cardiovascular procedures, and the cost of cardiovascular-related inpatient care. Resource utilization data were collected for all hospitalizations occurring between randomization and the end of follow-up. Costs were estimated based on observed levels of resource use and secondary data sources. **RESULTS:** The mean number of heart failure admissions was 53% lower among patients randomized to carvedilol (0.07 vs 0.15 for placebo [$P = 0.03$]); comparable reductions for cardiovascular and all-cause admissions were 30% (0.21 vs 0.30 [$P = 0.02$]) and 25% (0.30 vs 0.40 [$P = 0.003$]) respectively. For heart failure admissions, mean length of stay and the mean number of ICU/CCU days were reduced by 37% (6.8 vs 10.8 days [$P = 0.03$]) and 83% (0.7 vs 4.3 [$P = 0.001$]) respectively; for cardiovascular admissions, comparable reductions were 32% (7.4 vs 10.8 days [$P = 0.30$]) and 73% (1.5 vs 5.6 [$P = 0.05$]) respectively. Utilization of selected cardiovascular procedures was also nominally lower among patients receiving carvedilol. Estimated costs of inpatient care for heart failure and cardiovascular admissions were 81% ($P = 0.02$) and 57% ($P = 0.02$) lower respectively among carvedilol patients. **CONCLUSION:** In chronic heart failure patients receiving conventional therapy, addition of carvedilol reduced inpatient resource utilization and costs over the period of study.

INFECTIOUS DISEASE

ID1

MODELLING THE COSTS AND EFFECTS OF CMV MANAGEMENT STRATEGIES IN TRANSPLANT RECIPIENTS AS A SUPPORT FOR CURRENT AND FUTURE DECISION-MAKINGAnnemans L^{1,2}, Moeremans K¹, Kubin M³¹HEDM, Meise, Belgium; ²Brussels Free University, Brussels, Belgium; ³Bayer, Leverkusen, Germany

OBJECTIVES: We developed a generic decision analytical model to predict health and economic outcomes of different management options for cytomegalovirus (CMV) infection and disease in bone marrow and solid organ transplant patients. **METHODS:** The model considers the most prevalent management strategies, thereby emphasizing the important difference between “infection” and “disease”: 1°. prophylaxis and testing for infection, followed by pre-emption in case of infection; 2°. only testing for infection followed by pre-emption in case of infection; and 3°. wait, and treat once disease occurs. Clinical data was obtained from randomised controlled studies. A Bayesian analysis was applied to distinguish effectiveness of current management options for CMV infection versus CMV disease, an aspect that is currently underreported in literature. For each of the three strategies and in each transplant type, different management options and resource use data was obtained from key experts in large transplant centres in France, Germany, and the UK. Unit cost data was obtained from official sources from the health care payer’s perspective. Time horizon was one year. **RESULTS:** The model produces results for a variety of scenarios and management options. In general, prophylaxis is cost-effective in BMT (16,000 Euro/LYG; SE = 6,900) and dominant in liver transplants compared to alternative strategies, while in renal transplants, test and pre-empt is more preferable. Some particular current strategies such as acyclovir IV prophylaxis in bone marrow and IV immune globulin prophylaxis in renal transplants are not supported by the results. Sensitivity analyses show at the same time the robustness of current conclusions and the potential options for disease management. **CONCLUSIONS:** This model provides an exhaustive description of management options for CMV in transplant patients, and is useful both in current decision-making for optimal disease management, as well as in the assessment of future targets for research.

ID2

COST-EFFECTIVENESS ANALYSIS OF HEXAVALENT MENINGOCOCCAL B OUTER-MEMBRANE-VESICLE VACCINEBos JM¹, Rümke HC², Welte R³, Postma MJ¹, Jager JC³¹Groningen University Institute for Drug Exploration/ Groningen Research Institute of Pharmacy (GUIDE/GRIP), Groningen, The Netherlands; ²Laboratory of Clinical Vaccine Research, National Institute of Public Health and the Environment, Bilthoven, The Netherlands; ³Department of Health Services Research, National Institute of Public Health and the Environment, Bilthoven, The Netherlands

OBJECTIVE: To estimate the cost-effectiveness and program costs of vaccination with hexavalent meningococcal B outer-membrane-vesicle (OMV) vaccine within the framework of the Dutch vaccination program for newborns. **METHODS:** A pharmacoeconomic decision-analysis model was applied, linking epidemiological and economic data. Epidemiological data were obtained from

the Netherlands Reference Laboratory for Bacterial Meningitis. Standard methods for cost-effectiveness analysis were used. Analysis was done from a societal perspective, including direct and indirect costs of productivity loss (friction-costs method; price levels in 1998 €; discount rate of 4%). Cost-effectiveness ratios were expressed in net costs per quality adjusted life year (QALY) gained. Sensitivity analysis was performed on several key parameters of the model. **RESULTS:** In the base-case, through vaccination 480 QALYs are gained, while total net costs of the program are €5,546,923. The cost-effectiveness ratio is €11,600 per QALY gained. Sensitivity analysis indicates a cost-effectiveness range of €5,841 to 30,543 per QALY gained. **CONCLUSIONS:** Vaccination of all newborns with meningococcal OMV vaccine has an acceptable cost-effectiveness ratio compared to other interventions in the Netherlands.

ID3

PRELIMINARY EVALUATION OF THE CLINICAL AND ECONOMIC BENEFITS OF UNIVERSAL VARICELLA VACCINATION OF CHILDREN IN GERMANY

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OBJECTIVE: To provide a preliminary assessment of the economic value of vaccinating 1-year old children against varicella in Germany. **METHODS:** We developed a decision-analytic model to compare the clinical and economic outcomes of a universal varicella vaccination program versus no vaccination in infants. The model predicts the clinical effects, direct and indirect costs, and the cost-effectiveness of mass vaccination. Model input data were mainly derived from a large survey conducted across Germany and were complemented by literature data and expert estimates. In the survey, pediatricians, GP's and internists provided information extracted from 1334 randomly selected varicella patient records. Epidemiological data but also medical resource utilization such as physician consultations, medication, and hospitalization due to disease complications was captured. Additionally, work loss of caregivers and infected employed individuals was retrieved from the records. Since the survey was completed only very recently, the analysis of the model input data is preliminary. Valuation of the resources used was done by applying unit costs obtained from official medical tariff lists, drug compendiums, and other statistics. Vaccine efficacy was assumed to be between 90% and 97%, and vaccination coverage between 50% and 80%. Future costs were discounted at 5%. The perspective taken is that of the society. **RESULTS:** The prelimi-

nary findings presented here apply to a timeframe of 30 years. Over that period, the model predicts that universal children vaccination could prevent between 7.4 and 11.2 million varicella infections, and between 53,000 and 88,000 major complications depending on the assumptions taken. Universal vaccination also appears to be economically worthwhile with a benefit-cost ratio of between 2.1 and 1.9. **CONCLUSIONS:** These preliminary results suggests that universal varicella vaccination provide significant clinical and economic benefits to the German society. A final analysis is in process, which will be an important information source for healthcare decision-makers.

MULTIPLE DISEASES

MD1

AVOIDABLE HOSPITALIZATION: TRENDS AND ETHNIC VARIATIONS IN SINGAPORE, 1991-1998

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OBJECTIVE: To assess avoidable hospitalization as an outcome indicator of access to and quality of primary care by examining trends and gender and ethnic variations. **METHOD:** Aggregated nationwide data on annual hospital discharges in Singapore from 1991 to 1998 were collected from the Central Claims Processing System (CCPS) database. They included total hospitalizations (excluding maternity and psychiatric disorders) and hospitalizations for chronic diseases, which are avoidable by timely, appropriate and effective primary care (ambulatory care sensitive (ACS) conditions): asthma, congestive heart failure, chronic obstructive pulmonary disease, diabetes mellitus and hypertension. Directly age-standardized rates were adjusted for gender and ethnic differences in total hospitalizations. **RESULTS:** From 1991 to 1998, (total of 1,479,494 hospitalizations), 6.7% were for ACS conditions. Overall, the annual rate of avoidable hospitalization was 29.4 per 10,000 population. Women had lower rates of avoidable hospitalizations than males (22.4 versus 29.5 per 10,000), as well as for total hospitalizations (496.2 versus 515.5 per 10,000). Adjusted for total hospitalization, males were 1.3 times more likely than females to be hospitalized for ACS conditions. Compared to Chinese, Indian and Malays had higher rates of avoidable hospitalizations (21.7, 65.5 and 56.1 per 10,000 respectively). Adjusting for their higher rates of total hospitalization, they were 1.7 and 1.8 times respectively more likely than Chinese to be admitted for ACS conditions. Avoidable hospitalization decline (adjusted for total hospitalization) was -9.1% overall; greater in males (-11.8%) than in females (-5.3%); greater for Chinese (-15.8%), than Malays (-1.1%) and Indians (increase of +4.3%). Among Malays and Indians, women showed marked increases of avoidable hospitalizations, +10.8% and +8.1% respectively. **CONCLU-**