

tions. Typically, RSAs have been used for costly products for diseases with a high unmet need such as in oncology. To date, experience with RSAs in vaccines is limited. In this conceptual research we intend to identify RSAs that would be relevant and operable for vaccination programs. **METHODS:** We described the different types of uncertainties and associated financial risks a vaccine payer faces in the real-world setting. We conducted a literature review to list the various RSAs proposed in the field of therapeutics. We then assessed how existing RSAs can mitigate those vaccine payers' risks and evaluated those contracts for a hypothetical vaccine. **RESULTS:** Vaccine specificities (few doses, potentially a large target population, herd effect and delayed benefit) need to be accounted for when designing RSAs. Financial risks in vaccination budget may arise from uncertainty on effectiveness/safety, uptake, supply, and real-world implementation. RSAs, categorized in either cost-sharing or performance-based risk-sharing, could enable vaccine payers to diminish those risks. As for drugs, cost-based deals would be easier to implement for vaccines than performance-based RSAs. The second should only be used when vaccine effects are observed on the short-term. Insurance mechanisms such as real-option pricing can be used to quantify the risk and price the associated RSA. **CONCLUSIONS:** RSA can be used to mitigate financial risk associated with the access to vaccines. Based on the risks they entail, RSAs for vaccines can be viewed as real-option offered by the manufacturer to the payer. However their practical implementation is likely to differ from therapeutics.

PIN36

THE COST-EFFECTIVENESS OF TELAPREVIR TRIPLE THERAPY IN TREATMENT OF NAÏVE CHRONIC HEPATITIS C PATIENTS IN TURKEY

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OBJECTIVES: As evidenced in ADVANCE and IDEAL studies, sustained virologic response (SVR) rate in treatment-naïve (TN) CHC patients increased from the level of 40% to about 75% when TVR was added to standard of care. In this cost-effectiveness model, PR is compared with TVR triple therapy (with response guided treatment approach) in TN CHC patients. **METHODS:** Analysis population includes TN patients infected with genotype 1 HCV. Progression of HC is simulated by a Markov model with 1-year duration of cycles within life-time horizon. The sources of clinical inputs are ADVANCE and IDEAL studies, in which TN CHC patients had been randomized to TVR+P2aR or P2aR and to TVR+P2bR or P2bR, respectively. The sources of economic inputs are the drug price list (National Ministry of Health, June 2014) and procedure price list (National Institution of Security, April 2014). The analysis was performed from the point of view of the governmental payer, with direct costs only. The discount rate was set at 2%, national GDP per capita: 8.009€, year 2013, currency rate: 2.80 TL/Euro. **RESULTS:** Total costs of strategies were 21.938€, 17.933€ and 17.932€, for TVR, P2aR and P2bR, respectively. Corresponding QALYs were 16.19, 15.64 and 15.57 years. Therefore 0.55 and 0.62 QALYs were gained with extra costs of 4.018€ and 4.109€ (vs P2aR and P2bR, respectively). Thus, TVR was cost-effective as compared to P2aR and P2bR, taking the national GDP as the informal willingness-to-pay threshold. **CONCLUSIONS:** Although the initial cost of treatment with TVR is higher than peg-interferon and ribavirin, in CHC patients, the cost savings that will be realized with the very successful clinical prognosis make treatment with TVR clearly cost-effective. Therefore, all TN CHC patients should be considered as a candidate of TVR treatment.

PIN37

THE COST-EFFECTIVENESS OF TELAPREVIR TRIPLE THERAPY IN TREATMENT-EXPERIENCED CHRONIC HEPATITIS C PATIENTS IN TURKEY

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OBJECTIVES: As evidenced in REALIZE study, sustained virologic response (SVR) rate increased from the 17% to 63% in treatment-experienced (TE) chronic hepatitis C (CHC) patients, when telaprevir (TVR) was added to standard of care. In this cost-effectiveness model, PR is compared with TVR triple therapy (with response guided treatment approach) in TE CHC patients. **METHODS:** In this cost-effectiveness model, TVR+PR is compared with PR. Analysis population includes TE and unresponsive or failed patients infected with genotype 1 HCV. Progression of CHC is simulated by a Markov model with 1-year duration of cycles within life-time horizon. The source of clinical inputs is REALIZE study, in which TE CHC patients had been randomized to TVR+PR or PR. The sources of economic inputs are the drug price list (National Ministry of Health, June 2014) and procedure price list (National Institution of Security, April 2014). The analysis was performed from the point of view of the governmental payer, with direct costs only. The discount rate was set at 2%, national GDP per capita: 8.009€, year 2013, currency rate: 2.80 TL/Euro. **RESULTS:** Total costs of strategies (medications and other components) were 29.735€, 28.938€ and 28.343€, for TVR, P2aR and P2bR, respectively. QALYs gained was 1.25 years with TVR+PR with extra costs of 797€ and 1.393€ (vs P2aR and P2bR, respectively). Corresponding ICER values were 640€/QALY and 1.118€/QALY for TVR+PR vs P2aR and TVR+PR vs P2bR, respectively. Thus, TVR was definitely cost-effective. **CONCLUSIONS:** Although the initial cost of treatment with TVR is higher than PR, in CHC patients, the cost savings that will be realized with the very successful clinical prognosis make treatment with TVR clearly very cost-effective and close to cost neutral. Therefore, all TE CHC patients who not responded or failed after a response, should be considered as a candidate of TVR treatment.

PIN38

ECONOMIC COMPARISON OF EMPIRICAL VERSUS DIAGNOSTIC-DRIVEN STRATEGIES FOR IMMUNOCOMPROMISED PATIENTS WITH SUSPECTED FUNGAL INFECTION RESULTS FROM A CHINESE PAYER PERSPECTIVE

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OBJECTIVES: To examine the impact on costs and outcomes that may occur in neutropenic patients when treating for suspected invasive fungal infections (IFIs) caused by *Aspergillus* with typical empirical approach (EA) versus the recently proposed "diagnostic-driven" (DD) approach in China. **METHODS:** A decision-analytic model was used to estimate total costs and predicted survival associated with EA and DD approaches in Shanghai, China. The population included patients aged ≥ 18 years with hematological malignancies or autologous/allogeneic stem cell transplantation expected to be neutropenic for ≥ 10 days, and without prophylactic antifungal treatment. Rates of IFI incidence, IFI captured by EA, overall mortality, and IFI-related mortality (10.9%, 30%, 10.7% and 28.6%, respectively) were obtained from the literature. Survival rates for each strategy were generated based on the proportion of patients with identified and appropriately treated IFI. Treatment patterns with EA and DD approaches and resource use assumptions were based on the opinion of five clinicians from three top hospitals in Shanghai. The total medical costs (in 2014 Chinese Yuan) included antifungal drug cost, treatment-related adverse events cost, and cost of other medical resources. City-specific costing sources were used wherever possible. **RESULTS:** Both approaches had similar survival rates (90.76% vs. 91.33% for EA and DD, respectively). Antifungal drug cost per patient was ¥2,813 for EA and ¥2,307 for DD strategy. Although DD patients incurred a higher cost on PCR/GM testing (¥111 vs ¥88), the total medical costs of DD were substantially lower (¥2,563) than that of EA strategy (¥4,298) due to fewer patients receiving antifungal agents (DD: 7.4%; EA: 12.5%) with targeted IFI treatment. **CONCLUSIONS:** This study suggests that the DD approach has the potential to initiate antifungal treatment in a more targeted population. It is expected to be a cost saving management strategy for immunocompromised patients with suspected IFI in the context of China.

PIN39

THE BURDEN OF CLOSTRIDIUM DIFFICILE (CDI) INFECTION IN HOSPITALS, IN DENMARK, FINLAND, NORWAY AND SWEDEN

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OBJECTIVES: Calculate the hospital cost of treating patients with Clostridium difficile (CDI) in Denmark, Finland, Norway and Sweden. **METHODS:** National patient databases from each country provided the number of patients, hospitalisations and length of stay (LOS) for CDI patients (ICD-10 code A047); year 2011 in Finland and Sweden and year 2012 in Denmark and Norway. In Norway and Sweden hospitalisation cost was based on the DRG cost for CDI patient and in Denmark and Finland the cost per bed day. **RESULTS:** Sweden had the highest number of CDI patients and hospitalisations due to CDI during one year (3,425 patients and 4,723 hospital stays), then Finland (1,929 patients and 2,587 hospital stays), Denmark (1,804 patients and 2,465 hospital stays) and Norway (1,126 patients and 1,418 hospital stays). On average the patients in Sweden were hospitalised with CDI diagnosis 1.38 times during one year and the corresponding figures was in Denmark 1.37, Finland 1.34 and Norway 1.26. The mean LOS for patients with CDI as primary diagnosis varied from 7.0 days in Norway to 14.7 days in Finland (9.0 days, Denmark and 8.6 days, Sweden). The mean cost per CDI hospitalisation was lowest in Norway (€4,073 per patient), followed by Sweden (€6,261 per patient), Denmark (€7,234 per patient), and Finland (€10,231 per patient). The total cost for treating the hospitalised CDI patients during one year was approximately €11 million in Norway (5.1 million people), €15 million in Finland (5.4 million people), €18 million in Denmark (5.6 million people) and €30 million in Sweden (9.7 million people). **CONCLUSIONS:** The total cost of treating the CDI patients ranges between €11-30 million per country and year, and approximately 26-38% of these costs are due to recurrence of CDI. By lowering the number of recurrences, there would be a potential for large cost savings.

PIN40

EPIDEMIOLOGY AND COSTS OF VARICELLA AND HERPES ZOSTER IN GERMANY

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OBJECTIVES: Detailed and valid information on burden of disease is an indispensable cornerstone for cost-effectiveness analyses. The aim of this study was to estimate the epidemiological and economic burden of varicella and herpes zoster (HZ) in Germany in order to generate important data for a subsequent model-based analysis. **METHODS:** Analysis of the epidemiology and the one-year costs of varicella-zoster virus-related diseases/complications were based on 2010/2011 claims data from a large German sickness fund. Insured persons were included in the study when they had a varicella and/or HZ diagnosis in 2010, and then were followed for one year after the date of the initial diagnosis. Disease-attributable costs were either calculated by diagnosis-specific identification of cost items or by use of a control group approach. **RESULTS:** The study population included 12,710 insured persons with varicella and 35,636 insured persons with HZ. Age-standardised incidence rates were 1.55 and 5.5 per 1,000 person-years for varicella and HZ, respectively. The most frequent complication of HZ was post-herpetic neuralgia (PHN) with an overall proportion of 20.76%, ranging from 2.66% under the age of 10 years to 26.03% in the age group of 80 years and above. When using a time-based algorithm instead of a pure diagnosis code-based approach overall PHN proportion was much lower (5.29%). Average direct costs of varicella were €76.41, ranging from €45.92 in children <5 years of age to €444.28 in people aged ≥ 60 years. Direct costs of HZ (including PHN) were €238.47 with a range from €88.51 in children <10 years of age to €504.40 in people aged ≥ 80 years. **CONCLUSIONS:** Varicella-zoster virus-related diseases/complications cause a remarkable epidemiological and economic burden on the German health care system. Incidence and costs of varicella and HZ are highly age-dependent. Furthermore, the proportion of PHN was strongly influenced by the algorithm used to identify PHN cases.

PIN41

EVALUATING THE ECONOMIC BURDEN AND HEALTH CARE UTILIZATIONS OF U.S. VETERAN PATIENTS DIAGNOSED WITH CHRONIC HEPATITIS C

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OBJECTIVES: Examine the economic burden and health care utilizations of the chronic hepatitis C (CHC) in the U.S. veteran population. **METHODS:** A retrospective database analysis was performed using the U.S. Veterans Health Administration Medical SAS datasets (01OCT2007-30SEP2012). Patients diagnosed with CHC (International Classification of Disease 9th Revision Clinical Modification [ICD-9-CM] codes 070.44, 070.54, 070.70, 070.71) were identified, and the first diagnosis date served as the index date. A comparator group was created by identifying patients without a CHC diagnosis but of the same age, region, gender and index year, and matched according to baseline Charlson Comorbidity Index scores. The index date for the comparator group was randomly chosen to reduce selection bias. A 1-year continuous enrollment period pre- and post-index date was required for both groups. One-to-one propensity score matching (PSM) was used to compare health care costs and utilizations during the follow-up period between the cohorts, adjusting for baseline demographic and clinical characteristics. **RESULTS:** Eligible patients (N=87,837) were identified for the CHC and comparison cohorts. After applying 1:1 PSM, a total of 69,809 patients were matched from each group and baseline characteristics were well-balanced. CHC patients were more likely to be hospitalized (33.47% vs. 2.42%, p<0.0001) and had more emergency room (ER) (28.55% vs. 6.68%, p<0.0001), physician office (98.65% vs. 53.56%, p<0.0001), outpatient (98.81% vs. 54.46%, p<0.0001) and pharmacy visits (88.73% vs. 57.18%, p<0.0001), resulting in higher health care costs for inpatient (\$11,303 vs. \$691, p<0.0001), ER (\$345 vs. \$60, p<0.0001), outpatient (\$5,540 vs. \$1,382, p<0.0001), physician office (\$4,956 vs. \$1,230, p<0.0001), pharmacy (\$947 vs. \$433, p<0.0001) and total costs (\$17,789 vs. \$2,506, p<0.0001) for CHC patients, relative to comparison patients. **CONCLUSIONS:** U.S. veterans diagnosed with CHC were more likely to have higher health care resource utilization and were associated with a higher economic burden compared to matched controls.

PIN42

HOSPITALIZATION COSTS FOR COMMUNITY-ACQUIRED PNEUMONIA IN ELDERLY IN THE NETHERLANDS

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OBJECTIVES: To accurately estimate hospitalization costs of Community-Acquired Pneumonia (CAP) in elderly in the Netherlands. **METHODS:** This observational study was part of the CAPiTA-trial [1] and was conducted in 54 hospitals in the Netherlands between October 2008 and August 2013. CAPiTA participants with a suspicion of CAP were included. CAP was diagnosed on clinical and radiographic criteria according to the CAPiTA protocol. A re-admission within 30 days was considered as one episode. Data on health care use were collected prospectively using clinical files. Hospitalization costs were stratified by age-group (65-74, 75-84 and ≥85) and risk categories based on comorbidities (high (i.e. immunocompromised patients), medium (i.e. presence of other chronic conditions) and low). Costs are presented for the year 2012. **RESULTS:** 3,141 suspected CAP episodes were included. 1,835 confirmed CAP episodes (58.4%) were reported of which 124 cases were readmissions (6.8%). The first admission resulted in an overall mean length of hospital stay of 10.94 (SD ±9) days, in-hospital mortality rate of 10.7%, and average costs of €7,219 (95% CI [€6,653, €7,833]). General ward nursing cost accounted for 67.4% of all costs and ICU nursing for 27.8%. For the age-categories 65-74, 75-84 and ≥85 mean length of hospital stay was respectively 11.23, 10.86 and 10.56 days (p=0.534), fatality rate was 7.8%, 10.6%, and 15.5% (p=0.001) and mean hospitalization costs were €7,985, €7,240, €5,774 (p=0.041). When stratified by risk, the highest risk group showed the lowest mean costs (€6,551, p=0.019) and the highest mortality (21%). **CONCLUSIONS:** Health care costs decline with age and risk severity. The eldest age group experienced shorter ICU admissions and high mortality. Patients with medium and high risk for developing CAP showed a higher mortality rate and lower costs. 1. Hak, E., et al., *Neth J Med*, 2008.66 (9): p. 378-83.

PIN43

COST ESTIMATION OF HIV INFECTION IN GREECE: DATA FROM AN INFECTIOUS DISEASES UNIT

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OBJECTIVES: HIV-infection nowadays represents a chronic disease of high complexity affecting populations worldwide. Highly active antiretroviral therapy, where available, has resulted in prolonged life expectancy and increased quality of life, through an ever-increasing cost of HIV-infection. The present study aimed at estimating the health resources consumed by HIV-infected patients and their respective direct costs, on an annual basis, in Greece. **METHODS:** A retrospective study was performed in order to collect data from the medical records of 447 HIV-infected patients, followed in an Infectious Diseases Unit in Athens. The survey included all services and antiretroviral treatment that patients received in one year as well as their demographic data. The subjects of the study were stratified in three health states according to the CD4+ counts, as defined by the CDC classification system for HIV infection. The cost analysis evaluating the direct cost of HIV-infection was undertaken from a third-party payer perspective. **RESULTS:** The annual direct cost was calculated at 6,860.3€/patient, the largest part being attributed to antiretroviral therapy (5,741.8€, p=NS). The respective cost for providing health care services was estimated at 1,118.5€, with laboratory tests representing 13.5% of total cost (P<0.05), while hospitalization and outpatient visits accounted for 2.3% (p<0.05) and 0.5% (p=NS) respectively. Overall, direct cost/patient increased for lower CD4+ counts,

being associated with a rise in the average of laboratory tests and more hospitalizations. Direct cost for patients ranged from 6,066.8€ (>500 cells/ml) to 7,654.3€ (<200 cells/ml). **CONCLUSIONS:** The total direct cost of HIV-infection seems to increase with advanced disease. Considering the reduction of available resources, especially in a country such as Greece, where austerity measures take place, effective disease management represents a major challenge, and the improvement of health services provided to HIV patients is more than compelling.

PIN44

BURDEN OF DISEASE CAUSED BY INFLUENZA IN GERMANY - A RETROSPECTIVE CLAIMS DATABASE ANALYSIS

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OBJECTIVES: Seasonal influenza occurs in annual epidemics usually peaking during winter. The seasonal influenza virus can cause mild to severe illness and poses a burden for patients of all age groups. The objective of this study is to assess the disease burden and vaccination-rates based on claims data in different age groups for the influenza season 2012/2013 in Germany. **METHODS:** We conducted a retrospective claims data analysis using the Health Risk Institute research database, containing anonymized data of 3,953,260 individuals (appr. 4.9% of the German population). The study period comprised 1 October 2012 to 30 June 2013, patients were identified based on the ICD-10-GM codes for influenza. Vaccine-rates were calculated by identifying documented vaccinations. The disease burden was assessed based on occurring secondary diseases and health services utilization in the inpatient and outpatient sector. The relative frequency of the most common concomitant diseases (otitis media, pneumonia) was evaluated and compared to individuals not infected with influenza. Results were compared and validated against existing evidence. **RESULTS:** We observed 65,826 patients with a documented influenza during the influenza season 2012/2013. The occurrence of otitis media and pneumonia was higher in all age groups compared to the non-influenza-infected population and especially high in children. A total of 848 influenza-related hospitalizations were identified with a mean duration of 6 days, amounting to €4,945,686 and 8,532 days of inpatient care. Overall, 65% of these hospitalizations were caused by influenza (principal diagnosis), and even over 80% for patients aged 2-17 years. Moreover, total outpatient costs amounted to €14,947,976. Finally, vaccination-rates were below 4% for children and 37% for patients aged > 60. **CONCLUSIONS:** Seasonal influenza can cause severe outcomes leading to hospitalizations and excess costs. Especially influenza-infected children are affected by concomitant diseases resulting in a higher disease burden. Furthermore, documented vaccination-rates are quite low.

PIN45

DIRECT AND INDIRECT COST OF HCV-RELATED DISEASES IN ITALY: AN INCIDENCE-BASED PROBABILISTIC APPROACH

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OBJECTIVES: The hepatitis C virus (HCV) induces several pathological conditions worldwide with a substantial medical and economic burden. The objective of this study is to estimate the average annual cost incurred by the National Health Service (NHS) as well as society due to HCV in Italy. **METHODS:** A probabilistic incidence-based cost of illness model was developed to estimate an aggregate measure of the economic burden associated with HCV-related diseases either in terms of direct or indirect costs (impact of absenteeism computed according to the human capital method). A systematic literature review was carried out to reveal both epidemiological and economic data. Furthermore, a one-way probabilistic sensitivity analysis with 5,000 Monte Carlo simulations was performed, in order to test the robustness of results and define the proper 95%CI. **RESULTS:** Overall, the total economic burden associated with HCV-related diseases was estimated in € 1,05 (95%CI: € 0,61-€ 1,61) billion. A percentage equal to 61,4% were associated with indirect costs (95% CI: € 0,37-€ 0,99 billion) and 38,6% with direct costs (95% CI: € 0,23-€ 0,63 billion). For chronic hepatitis C, cirrhosis, hepatocellular carcinoma (HCC), liver transplantation and death from causes related to HCV was estimated an average annual economic burden amounting to € 0,26 (95%CI: € 0,14-€ 0,41), € 0,55 (95%CI: € 0,30-€ 0,87), € 0,051 (95%CI: € 0,0001-€ 0,25) € 0,05 (95%CI: € 0,03-€ 0,08) and € 0,15 (95%CI: € 0,06-€ 0,27) billion, respectively. **CONCLUSIONS:** Italy is one of the European countries with the highest number of people with chronic HCV infection, the leading cause of cirrhosis, HCC and liver-related death. HCV-related diseases causes a significant cost for Italian NHS, especially for each case of liver transplantation. These highly debilitating and life-threatening complications generate a rather large amount of indirect costs for the Italian society as well.

PIN46

COST OF INFLUENZA AND ACUTE RESPIRATORY INFECTIONS TREATMENT IN UKRAINE

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OBJECTIVES: During the influenza epidemic period (2009-2010) 17 % of Ukrainian population were sick. The aim was to assess the dynamics of incidence rates. We analyzed the costs of treating influenza and acute respiratory infections (ARI) in the four stages of medical care: 1 - primary care (PCP), 2-out-patient, 3-hospital, 4-intensive care unit during the period 2009-2010 (pandemic) vs 2010-2011. **METHODS:** We used the statistic data of the MoH of Ukraine, the incidence of influenza and ARI, and method "cost of illness" per 1 patient. **RESULTS:** In 2009-2010 influenza rate and ARI was 472,6 per 100000 population. The vaccination coverage was 239,104 people, that representing 0.518% of the total population. In 2010-2011 the influenza rate and ARI was 420.9 per 100000, respectively. The vaccination coverage was 602911 persons during 2010-2011 years, that's 1,312% of the total population. We obtained the following costs