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OBJECTIVES: Paediatric advisory guidelines recommend prophylaxis against respiratory syncytial virus (RSV) for infants with hemodynamically significant congenital heart disease (HSCHD). However, current recommendations have cast doubt as to whether prophylaxis is beneficial after 1year of age. The objective of this study is to determine whether there are differences in RSV-related hospitalizations (RSVH) in HSCHD infants receiving palivizumab during the first versus second season in the Canadian Registry of palivizumab (CARESS) database. **METHODS:** CARESS is a prospective registry of infants who have received ≥1 dose of palivizumab at one of 32 sites across Canada during the 2005-2014 RSV seasons. Demographic data were collected at enrollment and respiratory-illness-related hospitalization events were recorded monthly. Only infants aged <24 months with HSCHD were included in the analysis. **RESULTS:** 707 (35.1%) of 2013 infants were prophylaxed during the second season (average age in months: 4.7 [first season] vs 14.7 [second season]). There were no significant differences between first- and second-season infants in terms of baseline demographics. However, infants aged >1year had a more complicated neonatal course, with significantly longer neonatal length of stay (46.7 versus 25.6 days). 26 infants in the first year (RSVH rate: 2.26%) and 11 infants in the second year of prophylaxis (RSVH rate: 2.09%) were hospitalized. A Cox regression found that there were neither significant differences in hazards between infants in their first or second year of prophylaxis in terms of time to first RSVH nor relevant predictors of the neonatal course. **CONCLUSIONS:** Infants enrolled in the CARESS database in the second RSV season had a similar hazard of RSVH as those in the first year of life. These findings suggest that infants aged >1 year are equally at risk for RSVH and benefit from palivizumab prophylaxis.

PIN30

DETERMINANTS OF PERTUSSIS OUTBREAKS AND LESSONS LEARNT

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OBJECTIVES: Pertussis (whooping cough) is an acute, highly contagious infectious disease, causing uncontrollable and severe coughing. Pertussis outbreaks are increasingly common, but little is available on their determinants. Through a systematic literature review, this study aims at describing key drivers of pertussis outbreaks, and at listing reported recommendations. **METHODS:** A systematic review of literature on pertussis outbreaks was conducted, including references published between 2011 and 2014, using Medline, Embase, the Cochrane library and relevant websites as potential sources. All population-based studies reporting information about epidemiology, burden or costs of pertussis outbreaks were included, without geographical restriction. **RESULTS:** Thirty-eight observational studies from 14 countries were included. Three different kinds of key drivers were identified by authors. Disease-related drivers included delays occurring in diagnosis and isolation of cases, natural cyclic variations and possible pathogen-specific changes. Healthcare management-related drivers included differences in physician awareness and/or underuse of laboratory diagnosis method. Finally booster-related drivers included low vaccination coverage and waning vaccine-mediated immunity. Most studies attempted to provide recommendations. The need for vaccination campaigns was clearly stated in several studies, such as new vaccination strategies (vaccination of adults, maternal immunisation, earlier booster dose, cocooning strategy, etc.) or more generally availability of vaccines providing long-lasting immunity. Systematic laboratory confirmations and systematic reporting were also suggested to reduce the burden of pertussis. **CONCLUSIONS:** These results highlight the need to improve monitoring the epidemiology of pertussis, areas for improvement for pertussis healthcare management and the need to have boosters with optimal timing within the routine immunisation schedule. Additional research is to be carried out to support health authorities in the choice of the most adapted national vaccination programme.

PIN31

SURVIVAL ANALYSIS OF HIV AND AIDS TREATMENT IN KENYA

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OBJECTIVES: HIV and AIDS is a major cause of premature death and impose a large socioeconomic burden in Kenya. Antiretroviral treatment (ART) is one of the interventions being implemented to mitigate these impacts. Studies on the survival rate and the socioeconomic factors explaining survival of patients on treatment follow up are very rare in Kenya. The objective of this research was to estimate the survival rate and factors associated with survival of the HIV positive patients on ART and those not on ART. **METHODS:** Baseline characteristic of adults on ART and those not on ART with CD4 counts 250 and below at enrolment were collected from the patient charts between 2003 to 2010, from Mbagathi District Hospital (Mbagathi) (n=300) and Moi Teaching and Referral Hospital (Moi) in Kenya (n=400). Kaplan Meier and life table analysis were used and survival durations measured in 3 monthly intervals. **RESULTS:** The survival rate declined over time. Approximately 3% of the patients died within the first three months of treatment debut and 57% were still alive at the time of this study (after 78 months of follow up). 25% of the patients in Mbagathi died by the 11th cycle (33 months) (95% CI[7-15]) where as 25% of patients in Moi died by the 16th cycle (48 months) (95% CI[14-19]). In addition, after the initial 30 months of treatment follow up 77%, (95% CI[71.7-81.3%]) of patient enrolled in Mbagathi and 91.9%, (95% CI[88.5-94.3%]) enrolled in Moi were still alive, showing better survival rate of patients in Moi. The patients on ARVs were likely to survive longer than those not on ART, the female and married patients were also likely to survive longer than their male and unmarried counterparts. **CONCLUSIONS:** The study findings shows that ART increases the survival rates, being female and married are also associated with increased survival rates.

INFECTION – Cost Studies

PIN32

USE OF ORITAVANCIN FOR THE TREATMENT OF SKIN AND SOFT TISSUE INFECTIONS: A UK HOSPITAL BUDGET IMPACT ANALYSIS

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OBJECTIVES: Approximately 250,000 patients per year are admitted to hospitals in the United Kingdom (UK) with skin and soft tissue (SSTI) infections, accounting for ~1.6% of hospital admissions. Staphylococcus aureus accounts for >50% of SSTIs; methicillin-resistant Staphylococcus aureus(MRSA) infections represent approximately 13.7% of those. Treatment of SSTIs is costly and often involves intravenous (IV) antibiotic therapy, hospitalization of ≥10 days and may involve both inpatient stay and multi-day follow-up outpatient antibiotic parenteral therapy (OPAT). Hospitals and healthcare systems may reduce the economic burden of hospitalized patients through the use of OPAT and/or early hospital discharge. Oritavancin is a single, once only 1200 mg IV dose for the treatment of SSTIs caused by gram positive bacteria, including MRSA. The aim of this analysis was to quantify the annual economic impact to a UK hospital of using oritavancin in select moderate-to-severe SSTI patients. **METHODS:** A decision tree based on current clinical practice was constructed to estimate the economic value of using oritavancin. Current and future utilization of antibiotics were informed by published literature and clinical expert opinion. Clinical data were derived from the literature and oritavancin's pivotal phase III studies. Drug costs were derived from the British National Formulary. Other included costs were based on the UK 2014 NHS reference costs. **RESULTS:** For a UK hospital treating 100 SSTI patients per year eligible for IV antibiotics, using oritavancin conservatively (3.6% of patients) would decrease total annual cost by £2,922.52. Increased pharmaceutical costs (£6,111.21) were offset by reductions in drug administration costs (-£5,531.13) and hospitalization/OPAT costs (-£3,379.48). Inpatient and outpatient days of treatment were reduced by 8.2 and 16.4 days, respectively. **CONCLUSIONS:** Using oritavancin conservatively in moderate-to-severe SSTI patients is estimated to reduce costs by £29.23/patient by shifting patient care to the outpatient setting, allowing for early discharge, and reducing hospitalization and drug administration costs.

PIN33

A COST-EFFECTIVENESS AND BUDGET IMPACT ANALYSIS OF FIDAXOMICIN FOR TREATING CLOSTRIDIUM DIFFICILE PATIENTS IN GERMANY

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OBJECTIVES: Clostridium difficile infection (CDI) is a debilitating illness. In two phase III trials fidaxomicin produced comparable initial cure rates, significantly lower recurrence rates ($p<0.005$) and significantly higher sustained cure rates ($p=0.001$) versus vancomycin. This cost-effectiveness and budget impact model analysed the costs and outcomes of vancomycin and fidaxomicin for treatment of CDI in Germany. **METHODS:** The model was a Markov cohort simulation, with 10-day cycle length. The analysis timescale was either 40 days (hospital perspective) or 1 year (payer perspective). Clinical inputs included : 30-day CDI-attributable mortality, probability of clinical cure and 30-day probability of recurrence after end of treatment. The first-line treatment is either Dificlir (€1300) or vancomycin (€61). Second line treatment is user defined, and in the base case is vancomycin. Third line treatment is a rescue treatment (€1500), assumed to have 100% cure rate. The model is populated with cost data for Germany. Drug costs are based on list prices, and the costs of hospitalisation are DRG tariff rates; Cost per day of CDI treated on a general ward (€348). A deterministic sensitivity analysis was carried out to test the robustness of the model outcomes. The cost-effectiveness of six CDI patient subgroups was also analysed based on the two fidaxomicin clinical trials' results. **RESULTS:** The outcomes of the model for All Patient group: incremental cost per QALY gained €40,807, cost per recurrence avoided €2,068, and cost per bed-day saved €110. For the All Patient group fidaxomicin reduced the number of recurrences by 49%. Fewer recurrences led to a reduction in attributable deaths, a gain in life years; an improvement in quality of life; and a reduction in the number of bed-days. **CONCLUSIONS:** First-line fidaxomicin is likely to be a cost-effective treatment option, compared to vancomycin at a willingness to pay threshold of €50,000 per QALY gained.

PIN34

COST-UTILITY ANALYSIS OF THREE TYPES OF INFLUENZA VACCINES (TRIVALENT, TRIVALENT HIGH DOSE AND QUADRIVALENT) IN ADULTS AGED 65 AND OLDER UNDER UNIVERSAL INFLUENZA IMMUNIZATION PROGRAM (UIIP) IN ONTARIO, CANADA

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OBJECTIVES: This research aims to assess the economic impact and cost-utility of replacing trivalent inactivated influenza vaccines (IIV3) with the newer influenza vaccines – trivalent high dose (HD) or quadrivalent (IIV4) influenza vaccine in adults aged 65 and older under Ontario's Universal Influenza Immunization Program (UIIP) from healthcare and societal perspectives. **METHODS:** An analytical decision model was developed for the elderly (age 65-74, 75-84, and 85 and above) at two levels of health risks (high and low) with influenza-related health outcomes from Ontario or Canada. Ontario's demographic data and labor costs were extracted from Statistics Canada. Vaccine efficacies were based on post-marketing clinical study for HD and estimated from published literatures for IIV4. Antiviral treatment and over-the-counter medication costs were considered. Deterministic (DSA) and probabilistic sensitivity analyses (PSA) were conducted. Additional analysis was performed for long-term impact of influenza infections. **RESULTS:** Comparing to IIV3 under UIIP, IIV3 HD has a net societal budget impact of C$346,809 including premature deaths in a single influenza season. The incremental cost-effectiveness ratio (ICER) is C$3,763 per QALY gained from healthcare perspective and C$190 per QALY gained from

societal perspective. Replacing IIV3 with IIV4 would result a net societal budget impact of over C$3 million. The ICER of IIV4 vs IIV3 is C$20,733 per QALY gained from healthcare perspective and societally C$16,232 per QALY gained. At $50,000 per QALY gained threshold, 100% and 93.8% of PSA simulations were cost-effective for HD and IIV4, respectively, from healthcare perspective, and 95.3% for IIV4 from societal perspective. HD becomes a dominant alternative when long-term care costs are considered. **CONCLUSIONS:** Both HD and IIV4 are expected to reduce influenza-associated morbidity and mortality, and are cost-effective in the studied population comparing to IIV3; however, IIV4 is extended dominated by HD. Those conclusions were proven to be robust in sensitivity analyses.

PIN35

COMPARATIVE ANALYSIS OF HIV ANTIRETROVIRAL DRUGS APPROVALS AND PRICES IN THE US AND SAUDI ARABIA

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OBJECTIVES: Access to effective, low cost antiretrovirals (ARVs) is a public health imperative. This study compared ARV approvals and prices in Saudi Arabia (SA) and the United States (US) in 2014. **METHODS:** US Food and Drug Administration (FDA) ARV drug approvals data were collected from the FDA website. Likewise, ARV drug approvals and prices in SA were collected from the Saudi Food and Drug Administration (SFDA) website. ARV drug prices data were also collected from the World Health Organization (WHO) website. Descriptive analysis and paired t-test were performed. Statistical significance was set up at 0.05% **RESULTS:** In 2014, there were 27 ARVs and 9 fixed-dose combinations of ARVs approved by the FDA. The WHO listed 22 ARV single active ingredients and 16 combinations. Overall, 29.6% of the single active ingredients and 33.3% of the combinations approved by the FDA were marketed in SA. The FDA approved generic ARVs for 18.5% of the single active ingredients and for 22.2% of the combinations. The WHO listed generic ARVs for 31.8% of the single active ingredients and 100% of the combination drugs. No generic ARV drugs were approved by the SFDA. Price data were available for 13 drugs. ARV drug prices in SA were in median 21.14 times higher than the ARV drug prices listed by the WHO (range 2.2 - 99.8 times) ($p<0.0001$). **CONCLUSIONS:** Less than one third of the ARV drugs approved by the US FDA were marketed in SA in 2014. Prices in SA were significantly higher than prices listed by the WHO. Lack of SFDA approved generic ARVs may explain the price difference. Approvals of low cost generic ARVs remains a public health priority in SA to improve quality of life of HIV patients in the country.

PIN37

ECONOMIC ASPECTS OF INFLUENZA VACCINATION IN UKRAINE

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OBJECTIVES: To evaluate the cost of influenza vaccination, the sources of financing, and drug cost compared to the cost of vaccination in Ukraine. **METHODS:** We used the statistic data of the MoH of Ukraine, data about the rate of influenza vaccination. Comparative analysis of retrospective data on consumption of drugs and the cost of influenza vaccine. **RESULTS:** Vaccination against influenza and other acute respiratory infections (ARI) are not included in the list of obligatory vaccinations and not funded by the state, partially it funded from local budgets in Ukraine. During 2009-2010 flu had pandemic status, but the number of vaccinated people was minimal. It has been vaccinated 239104 people, among them the expense of businesses - 94546 (39.5%), local budgets - 106498 (44.5%) and patient funds - 38060 (15.9%). Only 2.18% people over 60 years were vaccinated, but this category represents 15.9% of the total population. We conducted that average cost of flu vaccination was 101,0 UAH (1 USD = 16,5 UAH). The average cost of ambulatory treatment per patient was 241,1 UAH, it was 2,4 times more than the vaccination cost Analysis of sales of drugs used for treatment of flu and ARI showed: NSAIDS were spent 118,8 mln. UAH., Expectorants - 275,3 mln., Antibiotics – 218,1 mln., but the cost of vaccines were 23,2 mln. UAH. The comparison showed that the cost of drugs for the treatment of influenza and ARI were at 26.4 times more than vaccines. **CONCLUSIONS:** We evaluated the high rate of incidence of influenza, low rate of influenza vaccination in 2009, a low percentage of vaccination of health-risk groups (for example, 60 +), the high cost on drugs to treat the flu and ARI. It confirmed the economic expediency of using influenza vaccine in Ukraine.

PIN38

COST-UTILITY ANALYSIS OF INFLUENZA VACCINES FROM SOCIETAL PERSPECTIVE: A COMPARISON OF THE HUMAN CAPITAL APPROACH AND FRICTION COSTS APPROACH IN THE VALUATION OF PRODUCTIVITY COSTS AMONG SENIORS IN ONTARIO CANADA

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OBJECTIVES: Although employment rate is lower in the elderly population, different methods valuing productivity loss can yield contrasting incremental cost-effectiveness ratios (ICER). This research aims to compare the impact of human capital (HC) and friction cost (FC) methods on productivity costs and incremental cost-effectiveness ratios (ICERs) of replacing IIV3 with either high dose (HD) or quadrivalent (IIV4) among adults aged 65 and over in Ontario. **METHODS:** Population-level influenza outcomes from either Ontario or Canada with provincial wage data set were used to calculate the productivity loss due to physician visits, ED visits, hospitalizations and premature deaths. Vaccines efficacies were extracted from clinical studies and published literatures. HC and FC utilized discounted life expectancy and 90-day friction period, respectively. Alternative friction periods and elasticity factors were analyzed. **RESULTS:** With IIV3 under the current Universal Influenza Immunization Program (UIIP), the productivity costs due to influenza-related premature mortality is C$11.92/person and C$0.86/person with HC and FC approach, respectively. Those per person for HD in place of IIV3 would be C$9.13 (HC) and C$0.65 (FC); for IIV4, the comparable estimates would be C$11.65/person (HC) and C$0.84/person (FC). ICER of HD vs IIV3 was C$190/QALY with HC approach and C$3,106/QALY with FC. In comparison, the difference of ICERs of IIV4 vs IIV3 was small - $16,232/QALY (HC) and C$19,028/QALY (FC). Exclusion of productivity costs of mortality had minimal impact with similar ICERs to FC method. **CONCLUSIONS:** The differences in ICERs of IIV4 vs IIV3 with HC method, FC method or no productivity costs of mortality were significantly narrower than those of HD vs IIV3. Relative vaccine efficacy against influenza-related deaths to IIV3 was a key driver of productivity costs; therefore, choice of methods could be crucial with massively different results. Those conclusions were robust to alternative friction periods and elastic factors.

PIN39

BURDEN OF DISEASE AND ECONOMIC IMPACT OF MALARIA IN COLOMBIA, 2012

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OBJECTIVES: Colombia is an endemic country for malaria. Burden of disease and costs estimations are scarce. The aim of this analysis is to estimate the burden of disease and the diagnosis and care costs of malaria, from the surveillance data. **METHODS:** A malaria transmission model was built from an age-dependent Markov process, to simulate the morbidity and mortality of the malaria infection in the Colombian population from the national surveillance system and other literature. The model included a birth cohort followed up to their life expectancy. We estimated the number of malaria, malaria complicates and death cases in the cohort during the life span. From the official malaria diagnosis and treatment guidelines we captured the frequency of use for all cost items and calculated the cost per patient from the tariff manual and international prices. Cost estimation was carried out from the third payer perspective. We estimated the disability adjusted life years (DALYs) and diagnosis and care costs for each malaria case and entire population during 2012 splitting by different Plasmodium specie. All costs were reported in 2012 American dollars (exchange rate of US$ 1768.23. per COP). **RESULTS:** During 2012 we estimated 65.448 cases and 32 deaths due to malaria. The 71.7% of cases were due to P. vivax and 27.0% by P. falciparum. Complications were presented in 1% of all cases. All malaria cases sum a burden of disease of 1902 DALYs (mainly due to year of life lost-YLL, 1878). Total estimated cost was US$936.253, 5% of them due to complicated malaria. **CONCLUSIONS:** Burden and costs of disease due to malaria in Colombia are relevant in spite of availability of effective preventive measurements. Cost-effectiveness of different public health interventions should be evaluate for the decision making process and this model will be a valuable input for that task.

PIN40

IMPACT OF SURGICAL SITE INFECTIONS FOLLOWING COMMON AMBULATORY PROCEDURES ON HEALTHCARE COSTS

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OBJECTIVES: Data on costs of surgical site infections (SSIs) following ambulatory surgery are sparse, despite a shift towards outpatient procedures. We determined the impact of serious and non-serious SSIs on healthcare costs following common ambulatory surgical procedures throughout the cost distribution. **METHODS:** We conducted a retrospective cohort study of persons < 65 years coded for cholecystectomy, breast-conserving surgery (BSC), anterior cruciate ligament reconstruction (ACL), or hernia repair from 12/31/2004–12/31/2010 using commercial insurer claims data. SSIs within 90 days after surgery were identified by ICD-9-CM diagnosis codes. Infections during inpatient hospitalization or resulting in surgical treatment were considered serious. Quantile regression controlling for underlying illness, operative variables, demographics, and surgical facility type was used to examine the impact of serious and non-serious SSIs on 180-day healthcare costs. RESULTS: The incidence of serious/non-serious SSIs (# procedures) were 0.8%/0.2% after ACL (21,062), 0.5%/0.3% after cholecystectomy (57,750), 0.6%/0.5% after hernia repair (60,681), and 0.8%/0.8% after BCS (42,489). Serious SSIs were associated with significantly higher costs than non-serious SSIs for ACL, cholecystectomy, and hernia repair at all points examined in the cost distribution. For BCS, serious SSIs were associated with significantly higher costs at the upper end (>=80th percentile) of the cost distribution. The ratio of adjusted total costs for individuals with serious SSI vs. no SSI increased for both cholecystectomy and hernia repair as the total cost increased (3.2 for cholecystectomy with serious SSI/no SSI at the 70th percentile of costs, up to 4.9 at the 95thpercentile). **CONCLUSIONS:** SSIs, particularly serious infections resulting in hospitalization or surgical treatment, were associated with significantly increased healthcare costs after 4 common surgical procedures performed in inpatient and ambulatory settings. Quantile regression illustrated the impact of serious SSIs on healthcare costs across the distribution of costs, especially at the upper end of the cost distribution.

PIN41

RECENT TRENDS IN URGENT ANTIBACTERIAL THREAT-RELATED HOSPITALIZATION IN THE US

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OBJECTIVES: Antibiotic resistance (ABR) poses a threat to public health in the United States (US). The Centers for Disease Control and Prevention has identified three ABR urgent threats (defined as potential clinical and economic impact, transmissibility, available treatment, barriers to prevention): Clostridium difficile (C. diff), carbapenem-resistent Enterobacteriaceae (CRE), and Neisseria gonorrhoeae (N. gonorrhoeae). Limited data exist which document ABR-related burden in the context of inpatient care. This study examines length of stay (LOS) and costs associated with ABR urgent threat-related hospitalizations in the US. **METHODS:** Using the 2001-2012 Healthcare Cost and Utilization Project's Nationwide Inpatient Sample databases, nationally-representative surveys of US hospitalizations, we identified hospitalizations with a diagnosis code indicating an urgent ABR threat. LOS and