DMTs. Five-fold cross validation was used to tune and evaluate traditional and regularized logistic regression, XGBoost, support vector machine, random forest and feed-forward neural network models. The best model was selected using the area under the ROC curve (AUC) and accuracy, recall, precision, F1-score and specificity were assessed. ***Results:*** Inpatient relapse was observed for 984 (5.2%) patients of 18,820 patients (mean age=44.2 years; females=75.8%). The XGBoost model had the best AUC (AUC=79.3%; accuracy=74.3%; recall=69.7%; precision=13.1%, F1=0.22, specificity=74.5%). Predictors of inpatient relapse included MS related HRU measures (previous IP or ER visit with MS diagnosis, number of MS related encounters, utilization of home care services and durable medical equipment), epilepsy/convulsions, paralysis, urinary tract infections, potential medication side effects (nausea and vomiting), use of muscle relaxants, anticonvulsants and antidepressants. Factors protective of relapse were increased PDC, older age, DMTs administered as infusion, Caucasian race and being female. ***Conclusions:*** Our study identified demographic and clinical predictors of inpatient MS relapse with high predictive accuracy. Our findings can potentially be utilized to better manage patients at high risk of relapse.

Economic Evaluation in Oncology Studies

EC1
A COST-EFFECTIVENESS ANALYSIS OF NIVOLUMAB PLUS IPILIMUMAB PLUS TWO CYCLES OF PLATINUM DOUBLET CHEMOTHERAPY VERSUS PLATINUM DOUBLET CHEMOTHERAPY IN THE FIRST-LINE TREATMENT OF STAGE IV OR RECURRENT NON-SMALL CELL LUNG CANCER IN THE UNITED STATES

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Objectives: To evaluate the cost-effectiveness of nivolumab plus ipilimumab plus two cycles of platinum doublet chemotherapy (NIVO+IPI+PDC) versus four cycles of PDC in the first-line (1L) treatment of stage IV or recurrent non-small cell lung cancer (NSCLC) from a health insurance perspective in the United States (US). ***Methods:*** A partitioned survival model with three health states (progression-free, progressed disease and death) was developed. Efficacy, safety and quality of life data were derived from the Phase-III CheckMate 9LA trial (CM9LA), with a minimum follow-up (FU) of 12.7 months for overall survival (OS)). Data from a more mature trial involving NIVO+IPI in 1L NSCLC, CM227 (37.7 months minimum FU for OS), were used to inform long-term OS over the 25-year (lifetime) horizon to capture the long-term survival effect observed from dual Immune-Oncology therapy. OS and progression-free survival was estimated based on CM9LA Kaplan Meier (KM) data up to 13 months then extrapolated using the conditional survival estimates from CM227. The CM9LA duration of treatment KM curves were used to estimate treatment costs. Resource use and direct medical costs (2020 USD) were included. EQ-5D based treatment-specific utility weights (US tariffs) were used. Annual discount rates of 3.5% for costs and outcomes were applied. Probabilistic sensitivity analyses (PSA) were conducted. ***Results:*** The incremental cost per quality-adjusted life-year (QALY) gained was $132,960. NIVO+IPI+PDC vs. PDC resulted in increased life-years (3.71 vs. 1.89), QALYs (2.86 vs. 1.37), and costs ($317,497 vs. 119,932). Drug acquisition cost for NIVO+IPI+PDC was the key driver of the difference in total costs. PSA results were consistent with the base case. ***Conclusions:*** NIVO+IPI+PDC offers a new cost-effective treatment option for patients in 1L NSCLC. Estimated incremental cost-effectiveness ratio is within the range of what is considered acceptable value for money within the metastatic cancer setting in the US.

EC2
MODELING APPROACHES TO ESTIMATE REALIZED REAL OPTION VALUE OF IPILIMUMAB IN METASTATIC MELANOMA

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Objectives: Real option value (ROV) is created when a drug enables a patient to live long enough to benefit from a future innovation, but few if any studies have quantified ROV observed in the real world. We aimed to estimate the realized ROV using real-world data (RWD) using ipilimumab in melanoma as a case study. ***Methods:*** We developed a framework for calculating ROV using RWD that accounted for the health gain in the standard therapy arm as well as the actual uptake of future innovative drugs. We developed a Markov model to estimate the quality-adjusted life-years (QALYs) gained with ipilimumab compared to chemotherapy for patients with or without subsequent cancer immunotherapy (CIT). The realized ROV of ipilimumab and chemotherapy was the additional health gain due to the CIT. To inform the model parameters, we used the nationwide Flatiron Health electronic health record-derived de-identified database to estimate real-world progression-free survival (PFS) and overall survival (OS) curves for patients stratified by the first- and subsequent-lines of therapy. Patients diagnosed with metastatic or advanced unresectable melanoma and started treatment between 1/1/2011 and date of 1st CIT approval (9/4/2014) were included. ***Results:*** The incremental QALYs gained for ipilimumab vs. chemotherapy without subsequent CIT were 1.74. With subsequent CIT, the incremental QALYs increased by 0.92, 0.60, 0.33, 0.18, 0.10, and 0.02 when CIT became available 0, 3, 6, 9, 12, and 24 months after the initiation of first-line ipilimumab, respectively. The results were sensitive to the survival benefit of ipilimumab, the survival benefit of subsequent CIT, and the uptake of CIT. ***Conclusions:*** This is the first study to demonstrate the realized ROV using RWD. The realized ROV was between 1%–54% of conventional value for patients diagnosed within 2 years before CIT availability. Further studies are needed to understand ROV in other diseases, particularly those with longer survival times.

EC3
ECONOMIC BURDEN OF CARDIOVASCULAR EVENTS IN PATIENTS WITH CHRONIC LYMPHOCYTIC LEUKEMIA TREATED WITH NOVEL AGENTS

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Objectives: Novel agent treatments (NATs) have improved survival in chronic lymphocytic leukemia (CLL), but can be associated with increased cardiovascular (CV) events. This analysis examined real-world healthcare costs associated with CV events in CLL patients treated with NATs. ***Methods:*** Using US-commercial administrative claims data (IBM MarketScan), we compared unadjusted healthcare costs among CLL patients taking NATs with and without a CV event during treatment (CV vs. noCV). Inclusion criteria were adult CLL patients, evidence of NATs (acalabrutinib, duvelisib, ibrutinib, idelalisib, venetoclax) between November 2013-November 2019 (index date=earliest fill date), continuous enrollment for 6-months pre-index (baseline), and no evidence of NATs or trial participation during baseline. Annual all-cause and CV-related healthcare costs (adjusted to 2019 US dollars) were measured in a fixed 12-month follow-up period while per-patient-per-month (PPPM) costs were compared in variable-length pre/post-CV event periods. ***Results:*** Of 1,886 CLL patients with NATs, 27.7% experienced a CV event during treatment, occurring a mean(SD) 103.0(93.9) days following NAT initiation. Almost half (47.1%) of CV patients had a CV event pre-index, the majority of which were hypertension. CV patients were older (71.7 vs. 65.8, $p<0.001$) and had a higher baseline NCI score (1.2 vs. 0.8, $p<0.001$) than noCV patients. Annual all-cause total healthcare costs were higher in the CV vs. noCV cohort ($203,349 vs. $165,144, $p<0.001$). Higher annual medical costs ($82,949 vs. $45,293, $p<0.001$) compensated for numerically lower NAT costs in CV vs. noCV cohort ($110,925 vs. $115,026, p=0.262). Pre-CV event, outpatient pharmacy PPPM costs contributed most to total healthcare costs; post-CV event, PPPM medical costs contributed more: outpatient pharmacy 74.8% vs. 38.8%, hospitalization 7.6% vs. 38.8%, and outpatient services 17.7% vs. 22.4%. ***Conclusions:*** In CLL patients with a CV event, higher medical costs compensate for decreased novel agent costs, suggesting increased medical management in addition to NAT discontinuation.

EC4
REAL-WORLD HEALTHCARE COSTS IN PATIENTS WITH CLASSICAL HODGKIN LYMPHOMA TREATED WITH PEMBROLIZUMAB AND NIVOLUMAB IN THE UNITED STATES

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Objectives: Patients with classical Hodgkin lymphoma (cHL) relapsed or refractory (R/R) disease incur substantial healthcare resource utilization and costs. The PD-1 inhibitors nivolumab and pembrolizumab were approved by the FDA (May 2016 and March 2017, respectively) as treatments for R/R cHL patients; however, literature on the healthcare costs of patients treated with these two medications is sparse. This retrospective study evaluated the medical costs of patients with cHL initiated on pembrolizumab compared to nivolumab in the US. ***Methods:*** Healthcare insurance claims from Symphony Health's Patient Integrated Dataverse® (07/2014-06/2018) were used to identify adult patients with cHL initiated on pembrolizumab or nivolumab (index date). Inverse probability of treatment weighting was used to adjust for differences in baseline patient characteristics between cohorts (evaluated in the 12 months prior to the index date). All-cause and cHL-related hospitalization and outpatient visit costs (based on provider charges) were reported per-patient-per-