DB3

A SPATIAL DISTRIBUTION OF ADULT OBESITY PREVALENCE IN DENVER COUNTY, COLORADO: AN EMPIRICAL BAYES APPROACH

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OBJECTIVES: Measuring obesity prevalence across geographic areas must take into account environmental and socioeconomic factors that contribute to spatial autocorrelation across neighboring areas. Dependency among observations across a geographic area violates statistical independence assumptions and bias estimates. Empirical Bayes estimators "smooth" variables with spatial autocorrelation, which limits the overall mean square-error and controls for bias estimates. **METHODS:** Using a new system for BMI surveillance in Colorado, we modeled the spatial autocorrelation of adult (≥ 18 years old) obesity (BMI ≥ 30 kg m^{-2}) in Denver County using patient-level electronic health record data from Kaiser Permanente Colorado (KPCO) between 2009-2011. We used an Empirical Bayes tool to calculate smoothed obesity prevalence across census tracts. SAS 9.2 was used to clean and aggregate data. GeoDa was used to calculate the Moran's I statistic to test for spatial autocorrelation across census tracts and smooth BMI data. KP Maps was used to map smoothed obesity prevalence. **RESULTS:** Among patients with a valid BMI, we measure patient counts >= 10 across 143 census tracts in Denver County, for a total sample size of 46,241 adults. Crude obesity prevalence for adults was 27.01% (95% CI 25.50-28.51%) and ranged from 10.98-45.73% across census tracts. Smoothed obesity prevalence was 26.93% (95% CI 25.63-28.24) and ranged from 13.19-42.03%. The Moran's I statistic for crude obesity prevalence was 0.7407 ($p \leq 0.001$) and the Moran's I statistic for the smoothed obesity prevalence was 0.7469 ($p \leq 0.001$), suggesting adult obesity prevalence in Denver County is distributed in a non-random pattern. **CONCLUSIONS:** Results reveal smoothed obesity prevalence for adults are non-random in Denver County at the census tract level. Clusters of smoothed obesity are highly significant (alpha=0.05) in neighboring census tracts of high obesity prevalence. Concentrations of obesity are primarily in the west and northeast of the county, with less clustering of obesity in the central and southern parts of the county.

DB4

THE APPLICATION OF NATURAL LANGUAGE PROCESSING (NLP) TECHNOLOGY TO ENRICH ELECTRONIC MEDICAL RECORDS (EMRS) FOR OUTCOMES RESEARCH IN ONCOLOGY

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OBJECTIVES: Many studies which use EMRs to evaluate oncology patients and practises have caveats around partial/missing observations within patient records. We describe an approach to build a potentially richer oncology dataset, supplementing EMR with case note observations through the use of NLP, applied specifically for the capture of molecular data. **METHODS:** NLP concepts are identified and created based on broad topics such as medications, signs, disease and symptoms, measurements and observations. The data is harvested from the notes fields within the deidentified EMRs (including inpatient, clinics, pathological etc.) provided to Humedica from over 25 large health care systems throughout the United States. Each NLP concept included in the data is associated with a unique subject record and a date of observation; allowing longitudinal tracking of concepts such as a molecular entities. Data from NLP are linked to patient EMR records to allow inclusion of the additional variables in further analyses. The method was applied to identify molecular testing data in a specific cancer type. **RESULTS:** Of the 18,068 included patients with valid clinical notes for interrogation, patient notes for 1,027 were observed to have a defined observation of a molecular test specific for the target of interest; 46.3% (475) of which were deemed positive (i.e. indicating presence of the molecular target); 41.5% (426) negative; and 12.3% (126) with unknown status. **CONCLUSIONS:** Innovative algorithms, technical skills and clinical knowledge are required in the generation and analysis of oncology disease data, and NLP can allow enrichment with variables which are not included in EMR, allowing more detailed understanding of patient cohorts. We have described an approach deemed to be successful in identifying cohorts of oncology patients with researchable molecular characteristics. Further correlating evidence and cross validation will determine the robustness and representativeness of the data generated with this approach.

HEALTH CARE POLICY STUDIES

HC1

CADTH RECOMMENDATIONS AS PREDICTORS FOR DRUG AVAILABILITY IN BRITISH COLUMBIA AND ONTARIO

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OBJECTIVES: The Canadian Agency for Drugs and Technologies in Health (CADTH) conducts health technology assessments and provides recommendations for drug listing and reimbursement. However, the health care providers of individual Canadian provinces are not obligated to follow CADTH recommendations. The aim of this analysis is to assess the value of CADTH recommendations as predictors for drug availability in British Columbia and Ontario. **METHODS:** This study included 93 CADTH recommendations for 88 drugs across 30 disease conditions. The British Columbia and Ontario formularies and special access programs were searched for these 88 drugs (some drugs were included more than once as CADTH reviewed them for multiple indications). Agreement was defined as any case in which drugs received positive CADTH recommendations and were listed by a province's health care system or in which they received negative recommendations and were not listed. A CADTH recommendation was only considered "negative" when CADTH specifically recommended that a drug not be listed. **RESULTS:** CADTH recommendations are significantly associated with both British Columbia's drug listings ($p<.01$) and Ontario's drug listings ($p<.01$). CADTH recommendations agreed with British Columbia listing decisions for 74% of the drugs reviewed by CADTH. Ontario agreed with CADTH for 76% of the drugs. Positive CADTH recommendations in particular often translated to availability in British Columbia and Ontario. Of the 57 drugs that received positive CADTH recommendations, 82% (47) are available in BC and 93% (53) are available in Ontario. Of the 36 drugs receiving negative CADTH recommendations, 61% (22) are unavailable in BC and 50% (18) are unavailable in Ontario. **CONCLUSIONS:** A positive CADTH recommendation is a good predictor of drug availability in British Columbia and Ontario. A drug that receives a negative CADTH recommendation, however, still has a significant probability of being listed by each province's health care system, especially through their special access programs.

HC2

THE IMPACT OF NICE'S END-OF-LIFE THRESHOLD ON PATIENT ACCESS TO NEW CANCER THERAPIES IN ENGLAND AND WALES

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OBJECTIVES: In January 2009 NICE introduced supplementary advice to aid patient access to end-of-life treatments. The advice allowed existing cost-effectiveness thresholds, with an estimated upper limit of £30,000 per QALY, to be extended to treatments indicated for patients with a short life expectancy, provided they apply to small patient populations and are shown to extend life by at least 3 months. Previous research has determined this extended threshold to be around £50,000 per QALY. The aim of this study was to investigate the trends in end-of-life appraisals and recommendations since their introduction in 2009. **METHODS:** NICE single technology appraisals for cancer therapeutics were reviewed from 2008 to 2013. ICERs were extracted from appraisals evaluated against the end-of-life criteria. **RESULTS:** During the timeframe considered, 31 appraisals were evaluated against the end-of-life criteria. Of the 21 appraisals considered to meet the criteria, 13 were recommended for use on the NHS, with ICERs ranging from £31,800 to £51,800 per QALY. However, between 2009 and 2013, the average yearly ICERs for end-of-life appraisals increased from £41,633 to £72,667. This general increase was reflected by a subsequent decrease in approved treatments over time. Between 2010 and 2012, 8 end-of-life treatments were approved; this is compared to 5 recommendations issued in 2009 alone. In 2013, no new end-of-life treatments were approved by NICE, with a lowest ICER in the submitted appraisals of £50,200 per QALY. **CONCLUSIONS:** The general trend of increasing ICERs in new end-of-life cancer appraisals has resulted in fewer treatments being approved by NICE in recent years. Given the limiting effect this could have on improving patient access, this may mean that patients need to rely on other funding sources, such as the Cancer Drug Fund in England, to access novel cancer therapeutics.

HC3

INCENTIVIZING VALUE IN MANAGED CARE DRUG FORMULARIES: DESIGN, IMPLEMENTATION, AND FIRST-YEAR OUTCOMES OF A VALUE-BASED FORMULARY

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OBJECTIVES: Increases in drug cost sharing without regard to value may produce adverse financial and informational incentives which could increase health plan costs and worsen health outcomes in the long term. In an attempt to align utilization with value, Premera Blue Cross, a large not-for-profit health plan in the Pacific Northwest, implemented a value based formulary (VBF) which utilizes cost-effectiveness analysis to determine the evidence-based value of each individual drug. The value of each drug is used to determine the corresponding formulary tier placement for the drug. The objective of this study is describe the design, implementation and first-year outcomes of Premera's VBF. **METHODS:** We compared observed pharmacy cost per member per month (PMPM) in the year following VBF implementation to observed pharmacy costs twelve months prior and to an expected counterfactual estimate if no changes were made to the pharmacy benefits. The counterfactual estimate was generated using autoregressive integrated moving average applied to prior thirty-six months pharmacy costs. We assessed drug use and adherence among individuals with diabetes, hypertension, or dyslipidemia utilizing an interrupted time series design with a comparison group composed of members from three employer groups which had the same pharmacy copay increases but did not implement a VBF. **RESULTS:** Premera pharmacy costs decreased by 3% or 11% PMPM compared to the twelve months prior or counterfactual estimate respectively. Among individuals with diabetes, hypertension, or dyslipidemia in the VBF cohort, there was no significant decline in adherence or number of users of medications for the treatment of diabetes, hypertension, or dyslipidemia. **CONCLUSIONS:** Despite an overall higher member cost share structure and potential health plan savings, the VBF was potentially able to maintain medication utilization in key disease states. Subsequent analyses utilizing longer follow-up and greater control for confounding will establish more valid estimates of outcomes and costs.

HC4

THE POTENTIAL IMPACT OF RECOMMENDATIONS MADE THROUGH THE COMMON DRUG REVIEW PROGRAM AT THE CANADIAN AGENCY FOR DRUGS AND TECHNOLOGIES IN HEALTH

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OBJECTIVES: The Common Drug Review (CDR), a pan-Canadian program at the Canadian Agency for Drugs and Technologies in Health (CADTH), assesses the clinical effectiveness, cost effectiveness and patient evidence of new drugs to provide

formulary listing recommendations to publicly funded drug plans. This study aims to determine the implications of implementing CDR recommendations. **METHODS:** CDR reviews from December 2010 to December 2012, for which an economic evaluation was submitted by the manufacturer, were assessed. A framework was developed where templates were created in Microsoft Excel for each drug submission to consider two scenarios: an uptake scenario (CDR recommendation implemented), and a counterfactual scenario (CDR recommendation not implemented). Drug costs and quality adjusted life years (if applicable) for both scenarios were determined at the population level using patient numbers reported in the manufacturer's budget impact analyses. The incremental net benefit was calculated, based on a willingness-to-pay of $50,000. In addition, sensitivity analyses were conducted to consider variation around the counterfactual scenario. **RESULTS:** Based on the results for the 55 drugs for which cost-utility or a cost-minimization analysis was submitted, the total incremental net benefit of implementing a CDR recommendation was calculated to be over 1 billion dollars over a 1-year time frame for participating provincial drug plans. Detailed sensitivity analysis explored the uncertainty around these estimates. **CONCLUSIONS:** Overall, the 10 drug plans included for this analysis would realize significant benefit by implementing CDR recommendations. Based on this research, a framework to assess the impact of CDR recommendations is being developed. Next steps include, consideration of disease specific estimates of net benefit and the inclusion of all participating drug plans to provide broader implications of overall CDR impact in Canada.

HEALTH TECHNOLOGY ASSESSMENT STUDIES

HT1
RECENT HEALTH TECHNOLOGY ASSESSMENT DECISIONS ACROSS THE GLOBE: A FOCUS ON ONCOLOGY

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OBJECTIVES: Due to a substantial oncology burden across the globe, there is an increasing need for innovative, more effective oncology treatments. Although the decision-making process differs among nations, health technology assessments (HTAs) aim to produce policies that achieve optimal value while improving patient care and health outcomes. The objective of this analysis was to evaluate recent patterns in oncology-based HTA decisions in selected countries. **METHODS:** HTA surveillance was conducted for Australia, Canada, France, Germany, and the United Kingdom (UK) from January 1, 2012 to August 31, 2013 (19 months). Oncology-based HTAs were evaluated by therapeutic area, decision, and rationale for the decision. Decisions were categorized as favorable, unfavorable, mixed (ie, both favorable and unfavorable), and neutral (ie, deferral). **RESULTS:** 67 oncology-related HTAs were published in the study timeframe. Across studied nations, 38 (57%) decisions were favorable, 25 (37%) unfavorable, 1 (1%) mixed, and 3 (4%) neutral. Of those unfavorable decisions, 13 were rejected for insufficient benefit to justify the high cost (ie, improperly high incremental cost-effectiveness ratio [ICER]), 9 for insufficient or unproven clinical benefit vs the most appropriate comparator, and 3 for incomplete or improper submission. Excluding mixed and neutral decisions, France was associated with the highest percentage of favorable decisions (14 of 15; 93%), followed by Germany (9 of 14; 64%), Australia (11 of 20; 55%), and the UK (4 of 14; 29%). **CONCLUSIONS:** Based on the last 19 months of oncology-based HTAs, over 50% of decisions were favorable. The most significant factor leading to rejection for oncology products is the inability to prove cost-effectiveness vs the most appropriate comparator, followed by unproven clinical benefit. This analysis suggests that manufacturers would have more success with HTA decisions, particularly in the UK, if more robust health economic and clinical data are generated.

HT2
ASSESSING THE VALUE OF TREATMENTS FOR RARE DISEASES USING AN MCDA-BASED APPROACH: METHODOLOGICAL AND ETHICAL FOUNDATIONS OF CRITERIA SELECTION AND FRAMEWORK DEVELOPMENT

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BACKGROUND: Appraising rare disease treatments involves multiple issues and represents a significant challenge for HTA agencies. Multicriteria-approaches are uniquely suited to assess their real life value. **OBJECTIVES:** were to develop a framework adapted to rare diseases while remaining compatible with other therapeutic areas for broad application. **METHODS:** Adaptation of the framework to rare diseases was based on methodological and ethical principles underlying the EVIDEM framework, informed by issues and policies specific to rare diseases, which were identified through literature review and survey, and guided by pragmatic considerations of real life application in participatory processesCriteria selection followed MCDA principles: completeness; non-redundancy; operationalizability; and independence. MCDA model mechanics and sensitivity analyses were designed based on a review of MCDA modeling. **RESULTS:** Quantitative criteria of the framework are organized into a hierarchical MCDA model consisting of six domains of value (top-level criteria): *Need*, *Type of benefit*, *Outcomes*, *Economic consequences*, *Knowledge*, and *Established priorities*. Each domain includes criteria and subcriteria, each contributing to the final output of the model, i.e., the Value Estimate. The model explicitly takes into account aspects of rare diseases, including: disease complexity; treatment outcomes complexity; multiple economic and social consequences; data limitations and innovative approaches to tackle these; and health care system priorities. Weighting and scoring methodologies capture individual perspectives and judgments on the meaning of data while allowing for full exploration of uncertainty through six types of sensitivity analyses. Qualitative criteria support consideration of the impact of contextual issues. **CONCLUSIONS:** This framework promotes a comprehensive, transparent and systematic appraisal of rare disease treatments while remaining applicable to any therapy. Although numerical outputs are produced, the framework is intended to support deliberative processes that allow sharing of perspectives and rationales for decisions. Intended to measure value in its broad sense, the framework supports sustained application of MCDA in health care decisionmaking.

HT3
IDENTIFYING RECENT TRENDS IN HEALTH TECHNOLOGY ASSESSMENTS FOR CROHN'S DISEASE

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OBJECTIVES: To identify the types of coverage recommendations made by key ex-US health technology assessment (HTA) organizations for biologic treatments in Crohn's disease (CD) and to understand how these organizations interpret evidence to support these recommendations. **METHODS:** Publicly available HTAs on CD from January 2009 to June 2013 for the following organizations were reviewed: CADTH (Canada), CONITEC (Brazil), HAS (France), IQWiG (Germany), NICE (UK), PBAC (Australia), and ISCIII (Spain). HTAs were identified using an HTA search engine and were supplemented with separate manual searches for CD-related reports on each HTA organization's website. When additional context was needed to evaluate the HTA with the most recent recommendations, older HTAs were identified and reviewed. For each organization, the recommendation and corresponding clinical and economic rationales were reviewed and extracted. **RESULTS:** In total, nine HTAs were reviewed across five organizations; no HTAs on CD from IQWiG or ISCIII were identified. All HTAs endorsed the use of infliximab and adalimumab for CD from a clinical perspective. Recommendations for subpopulations including fistulizing disease, pediatrics, and prior/concurrent corticosteroid use varied. Recommendations were consistent with the host country's approved labeled indications when appropriate cost thresholds were met, with the exception of PBAC, where adalimumab was additionally deemed appropriate for fistulizing disease, and CONITEC, where certolizumab was not endorsed due to safety concerns. Research gaps identified include the lack of head-to-head trials for adalimumab vs. infliximab and the paucity of long-term clinical and economic evidence. **CONCLUSIONS:** Infliximab and adalimumab generally received positive endorsements in CD, despite being frequently scrutinized by HTA organizations for their high costs. The expiration of patents and the introduction of biosimilars will likely shift how HTA entities evaluate clinical, economic, and humanistic evidence for biologic treatments for CD in the future.

HT4
COST-EFFECTIVENESS REVIEWS BY HTA AGENCIES: A COMPARISON OF FACTORS LEADING TO UNFAVOURABLE REVIEWS FOR ONCOLOGY AGENTS

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OBJECTIVES: The purpose of this study was to identify factors leading to unfavourable reviews of cost-effectiveness analyses (CEAs) for oncology products by comparing recent summary reports from multiple HTA agencies. **METHODS:** We utilised reports issued by HTA agencies of the UK (NICE), Scotland (SMC), Canada (pCODR), and Australia (PBAC) for this study due to their detailed and publicly available evaluations of CEA submissions. We examined the factors driving unfavourable appraisals by comparing recent reports of 13 selected oncology drugs launched between January 2012 and December 2013. The following factors were examined and compared as predictors for negative decisions: (1) nature of the modelled patient population, (2) comparator selection, (3) survival analysis approach, and (4) sensitivity analyses performed. **RESULTS:** Issues related to one or more of these factors were often cited as leading to higher and more uncertain ICER values that HTA bodies viewed unfavourably. The SMC and NICE frequently took issue whether the patient populations sourced as inputs into the CEAs were representative of the intended indication in each respective country. All HTA agencies took issue with survival analysis methods that assumed a carry-over of benefit into post-treatment states. Similarly, HTA bodies typically critically examined the extrapolation methodology of studies with immature survival data. Although various combinations of these identified factors were likely to lead to negative HTA decisions, robust sensitivity analyses (especially regarding extrapolation methods and input sources) that clearly identified the factors driving ICER values were cited favourably by HTA agencies. **CONCLUSIONS:** Manufacturers must carefully select the survival analysis approach that is suitable for their asset given the clinical data available, such that the benefit of their product is not overstated; performing robust sensitivity analyses to account for uncertainty may help to maximise favourable HTA appraisal outcomes in CEA markets.

MEDICATION ADHERENCE STUDIES

MA1
NON-ADHERENCE IS ASSOCIATED WITH POORER HEALTH OUTCOMES AMONG WOMEN CURRENTLY TREATED FOR BREAST CANCER WITH ORAL ENDOCRINE THERAPY

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OBJECTIVES: Non-adherence rates with oral endocrine therapy (ET) in women with breast cancer (BC) are 25%-50% and lead to inferior survival. Understanding the effect of non-adherence on health outcomes is necessary to develop effective interventions. This study examined real-world non-adherence and health outcomes among women using ET. **METHODS:** Female respondents from the 2010-2012 U.S. National Health and Wellness Survey were included if reporting a diagnosis of BC and treatment with aromatase inhibitors (n=261), selective estrogen receptor modulators (n=113), or their combination (n=7). The Morisky Medication Adherence Scale (MMAS-4 or MMAS-8, modified for use in oncology) was used to assess adherence, standardized using z-scores. Descriptive analyses examined adherence, sociodemographics, and health behaviors. Bivariate analyses com-