COMPARISON OF TRADITIONAL MULTIVARIABLE LOGISTIC REGRESSION AND PROPENSITY SCORE APPROACHES FOR CONTROLLING FOR TREATMENT SELECTION BIAS USING MONTE CARLO SIMULATION

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OBJECTIVES: In the absence of well-controlled clinical studies, medical records provide a potential wealth of information about the value of treatments; however, differences in pretreatment patient or other characteristics may influence treatment assignment and lead to biased estimates of treatment effects. Several strategies are available to reduce treatment selection bias. These include multivariable regression (MR) and propensity score (PS) techniques. Cepeda and colleagues (Am J Epidemiol 2003;158:280–7) demonstrated that PS is less biased than MR when the ratio of number of events to number of confounders (R(E)) is less than 8 by simulation. Using methods deemed more appropriate than Cepeda, we set out to evaluate conditions upon which their conclusions may be incorrect. METHODS: Monte Carlo simulation was performed in which each subject: 1) had 10 confounders (Zk : k = 1, . . . , 10) generated using normal and Bernoulli distributions; 2) was assigned to exposure or non-exposure with probability p determined by confounding variables; and 3) was given a binary response variable with probability g determined by confounder and exposure strength of association. For each simulation, binary logistic regression was used to: 1) generate individual Ps by regressing exposure variable on the confounder variables Z; and 2) estimate PS- and MR-adjusted treatment effects. Process was repeated 1000 times to evaluate bias and power of the statistical test. RESULTS: MR method produces asymptotically unbiased estimate of treatment effect; a result that is only marginally affected by the R(E). Even when R(E) was 4.5, MR produced unbiased estimate of treatment effect with larger sample size. Contrary to the MR method, PS produces estimates that are consistently lower than the true effect regardless of sample size or R(E). Power is always lower using the PS method. CONCLUSION: Results suggest PS method provides no statistical advantage over traditional MR; a conclusion that is contrary to Cepeda et al recommendations.

MC3

CONTROLLING FOR COMORBIDITIES USING VARIATIONS OF THE CHARLSON COMORBIDITY INDEX ON MEDICARE CLAIMS DATA: THE CASE OF OVERACTIVE BLADDER

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OBJECTIVES: To compare variants of the Deyo-modified Charlson Comorbidity Index (DM-CCI) as comorbidity adjustors when predicting annual health care costs attributable to a specific condition using administrative data. METHODS: We extracted all medical claims for Medicare individuals >65 with continuous coverage for Medicare parts A and B (N = 1.2 million) during 2003 and 2004 from files obtained from the Centers for Medicare and Medicaid Services. In order to estimate annual expenditures attributable to overactive bladder (OAB), we used multiple regression techniques that adjusted for demographics (age, race, region, gender) and comorbidities. Comorbidities were defined in four ways. Method 1 used the DM-CCI as the only measure of comorbidity. Method 2 used the DM-CCI plus indicator variables for other conditions not included in the DM-CCI that were not considered sequelae of OAB (hyperlipidemia, depression/anxiety, hypertension, heart disease, osteoarthritis, cataracts/glaucoma, enlarged prostate, musculoskeletal conditions excluding arthritis, GERD, and neurological conditions). Model 3 was identical to Model 2 but excluded depression/anxiety. Model 4 was identical to Model 2 but also included events and conditions related to OAB (UTIs, skin infections, falls/fractures, and vulvovaginitis). RESULTS: Mean annual expenditures attributable to OAB were $2278, $825, $996, and $94 per individual with OAB for Models 1, 2, 3, and 4 respectively. CONCLUSION: Attributable costs calculations using regression techniques may be very sensitive to the specification of comorbid conditions. Analysts need to avoid both the omission of key confounders, which can overstate the cost of a condition (e.g., Model 1), and over-specification, which will underestimate the cost of a condition by attributing too much cost to comorbidities that are actually related to the condition of interest (e.g., Model 4). Candidate comorbid conditions must be considered carefully before they are included in regression models to predict condition-specific attributable costs.

MC4

TIME HORIZON BIAS IN ECONOMIC EVALUATIONS

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OBJECTIVES: To systematically evaluate the impact of time horizon choice on the incremental cost-effectiveness ratio (ICER) under varying assumptions regarding treatment effectiveness, costs and discount rate. METHODS: We developed a Markov model, comparing two hypothetical strategies and predicting marginal quality adjusted life years (QALYs), costs and ICERs as a function of time horizon (ranging from 5 to 50 years). We assumed that clinical trial data is available for 5 years of follow up. The model was analyzed for the following scenarios: extrapolation of survival benefit (optimistic, intermediate, conservative), prediction of treatment costs (one time costs only, constant continued incremental cost with/without cost decrease after 10 years), and discount rate (undiscounted, same discount rate for QALYs and costs, differential discount rate for QALYs and costs). RESULTS: The effect on ICER is greatest when comparing a 5 year to a 10 year or longer time horizons. For most scenarios the ICER does not change much when extending the time horizon beyond 15 years (less than 20% relative change in ICER). The choice of time horizon conditional on the extrapolation method of survival benefit (optimistic and intermediate scenarios) for one time cost scenarios had the greatest impact on reducing the ICER (reduction of >60% if using 10 year instead of 5 year time horizon). In scenarios with continued costs, the ICER was sensitive to a cost decrease after 10 years but less sensitive to the discount rate. CONCLUSION: Current guidelines suggest adopting a lifetime time horizon when a mortality benefit is present. Our study measures the bias associated with adopting the time horizon of a clinical trial, a common practice. Most susceptible to bias are scenarios with one time costs as the ICER is most sensitive to the chosen extrapolation method for survival benefits. The choice of time horizon and its impact on ICER warrant careful consideration.

PODium SESSION II: NEUROLOGY

EMPLOYEES WITH FIBROMYALGIA: MEDICAL COMORBIDITY, HEALTH CARE COSTS, AND WORK LOSS

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OBJECTIVES: To compare health care use, health care costs, and work loss costs in employees with fibromyalgia (FM) to