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Northeastern State University, "18. Statistics" (2016). *Oklahoma Research Day Abstracts*. 15.
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Abstracts from the 2016 Oklahoma Research Day

Held at Northeastern State University

05. Mathematics and Science

18. Statistics

05.18.01 Leisure Time Physical Inactivity (LTPIA), Obesity and Diabetes (DM) Rates in the Southern United States (US)

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Background: Nearly 29,000,000 US adults have DM plus 86,000,000 have prediabetes. Physical inactivity is a modifiable risk factor for obesity, prediabetes and DM. People in the Southern US are more likely to be inactive than those in other US regions. Purpose: This study explores changes in and relationships among age-adjusted prevalence rates of LTPIA, obesity, and DM in the Southern US from 1994-2012. Methods: National LTPIA, obesity, and DM data from the Behavioral Risk Factor Surveillance System (BRFSS) were analyzed using SPSS. Datasets included age-adjusted percentages for each state on even numbered years. Results: In 1994, mean national rates of LTPIA, obesity, and DM were 29.5% (CI 27.26, 31.85), 14.1% and 4.5% (CI 3.58, 5.67), respectively. In contrast, mean rates of LTPIA, obesity, and DM in the Southern US were 36.2% (CI 33.9, 38.6), 15.1% and 5% (CI 4.05, 6.16) respectively. Mean obesity rates increased from 15.1% to 30.1%; mean DM prevalence rose from 5% to 10.3% (CI 9.5, 11.6); mean LTPIA rates dropped from 36.2% (CI 33.9, 38.6) to 26.2% (CI 24.8, 27.6) in the Southern US over the 18 years. Nationwide patterns were similar, but less severe. Conclusions: LTPIA, obesity and DM rates in the Southern US are higher than national rates. Although self-reported LTPIA rates have dropped 28% in the Southern US, obesity and DM rates have continued to rise.

05.18.02 Discovering Trends in UCO Student Parking Tickets

Murray, Cynthia University of Central Oklahoma

Cho, Seoungbean University of Central Oklahoma

This study examined UCO student parking tickets for 2014, fall semester (N=8,304). The research questions for these student ticket recipients pertained to the distributions for age, gender, college associated with their major, and number of hours completed. Comparative data based on the UCO student body enrollment for 2014-2015 was also reported. A disproportionate number of tickets, as compared to enrollment demographics, occurred for students age 21-25, male, not affiliated with a specific college, or post-baccalaureate/continuing education. A seasonal exponential smoothing model was fit to the daily number of tickets and criteria for how well the model fit the data was examined. The most ticketed parking lots and the most number of tickets, adjusted for the number of parking spaces available in the lot, were also identified. SPSS, SAS, and EXCEL were used for graphs and statistical tests.

05.18.03 How Accident Prone are Oklahomans?

Murray,Cynthia *University of Central Oklahoma*

Zhou,Qingwen *University of Central Oklahoma*

This study examined hospital discharges in Oklahoma for accidental injuries. Nationally, unintentional injuries are the 4th leading cause of death (CDC). The Oklahoma State Department of Health provided data for 2010 – 2012 (47,921 discharges). The research questions for these patients pertained to the distributions for age, race, gender, and type of insurance. Estimated survival distributions using hospital length of stay and discharge status were compared for each race. The most common injury types and the causes for those injuries were identified. The most common was for falls resulting in a lower limb fracture. Length of stay (LOS), an indirect indicator of the severity of the injury, was also summarized with regard to gender and race. The average LOS for males was significantly greater than that for females; average LOS for blacks was greater than that for whites. SPSS and SAS were used for graphs and statistical tests.

05.18.04 Which Cancer is the Biggest Threat to our Lives: Breast, Colon, or Prostate?

Murray,Cynthia *University of Central Oklahoma*

Zhou,Qingwen *University of Central Oklahoma*

Nationally, cancer remains the 2nd leading cause of death, just behind heart disease. This study examined data from the Oklahoma Cancer Registry, 2009-2011, for breast, colon, and prostate cancer cases (N=22,663). The research questions for these cancer patients pertained to the distributions for age at diagnosis, race, and survival. Means for age at diagnosis, proportions within each race, and estimated survival distributions (difference between diagnosis date and date of death) were compared for each type of cancer. All statistical comparison were significant ($p < 0.05$). Breast cancer has the youngest age at diagnosis, the highest proportion of whites with regard to race, and the best estimated survival distribution. SPSS was used for graphs and statistical tests.

05.18.05 Statistical Analysis of the Progression of Tumors in Rats

Murray,Cynthia *University of Central Oklahoma*

Bayles,Esther *University of Central Oklahoma*

Chen,Wei *University of Central Oklahoma*

The research team at the University of Central Oklahoma studied the combination of lasers and immunotherapy on tumor-bearing rats. Their cancer treatment involved three components: laser immunotherapy (LIT), Cyclophosphamide (CY), and Glycated Chitosan (GC). Rats in Group 1 had LIT (10 minutes), GC, and CY; Group 2 had LIT (5 minutes), GC, and CY; and Group 3 received only CY. Data pertaining to the tumors was analyzed using the Kaplan-Meier survival method to determine if there was a difference in “time to failure” distributions with the variation of treatment. Three time intervals (days) were computed: time between tumor inoculation and disappearance of the primary tumor, time between disappearance of the primary tumor and recurrence, and time between inoculation and metastasis. Tumor outcomes were categorized as either a failure or censored observation. Censored observations occurred if there was no failure by either the end of the study or when the rat was euthanized. For each of the three computed time intervals, there was no significant difference ($p > 0.05$) between treatment groups with regard to the estimated survival distributions.

05.18.06 A Statistical Analysis of Challenges Faced by First-Time Presidents in Public, Comprehensive Institutions

Ford,Lance *University of Central Oklahoma*

Dimandja,Christian *University of Central Oklahoma*

Bayles,Esther *University of Central Oklahoma*

Kinders,Mark *University of Central Oklahoma*

Morris,Tracy L. *University of Central Oklahoma*

There is substantial anecdotal evidence that first-time presidents of public, comprehensive institutions of higher learning face enormous challenges in trying to acclimate to the roles of president. A 38-item survey was conducted of such presidents in an attempt to quantify this acclimation process. Items concerning demographics, type of institution, life experiences, and activities and staff that were helpful in the acclimation process were included. In all, 61 presidents responded to the survey. In this research we focus specifically on the relationships between the type of institution, replacement of senior staff, and other demographic variables. To explore these relationships, three dependent variables were considered and regression models were created to predict these variables based on survey questions. The participants were categorized by institution type (turnaround or realignment), replacement of senior staff (yes or no), and how many senior staff members were replaced. Logistic regression models were developed to predict the dichotomous outcomes of institution type and replacement of senior staff, and a multiple regression model was created to predict the number of senior staff replaced by the institution president. Each model included different independent variables to predict the outcome.

05.18.07 Use of Concomitant Antihyperglycemic Medications with the V-Go® Insulin Delivery Device in Patients With Diabetes

Sanders,Jessica *University of Central Oklahoma*

Webb,Ariel *University of Central Oklahoma*

Morris,Tracy L. *University of Central Oklahoma*

V-Go® is a disposable insulin delivery device used by patients with diabetes requiring the use of insulin. V-Go is a device worn by the patient that delivers a steady dose of insulin for 24 hours and on-demand mealtime dosing as opposed to traditional multiple daily injections of insulin. A previous study (Lajara et al., 2015) of 204 diabetic patients found that there was a significant decrease in HbA1c after patients started using V-Go. The research presented here concerns the use of concomitant antihyperglycemic medications with the V-Go disposable insulin delivery device. The medical records of 56 patients using V-Go were examined. Weight (in kg), HbA1c, and fasting plasma glucose (FPG) were recorded for each patient at baseline and two follow-up visits. Whether or not the patient was taking concomitant antihyperglycemic medications was also recorded at each visit. A two factor repeated measures analysis of covariance was performed for each medication with respect to each outcome variable (weight, HbA1c, and FPG). The two factors were office visit and drug, and the covariate was the baseline measurement of the outcome variable. Only one medication was found to be significantly related to any of the outcome variables. Specifically, the mean HbA1c was significantly lower among patients taking an SGLT2 inhibitor along with V-Go, than among patients not taking an SGLT2 inhibitor ($p=0.0011$).

05.18.08 Use of Regular Insulin in the V-GO® Disposable Insulin Delivery Device

Webb,Ariel *University of Central Oklahoma*

Sanders,Jessica *University of Central Oklahoma*

Morris,Tracy L. *University of Central Oklahoma*

Type 2 diabetes is often controlled using non-insulin glucose lowering medications, but as the disease progresses, insulin is generally used. The V-Go® disposable insulin delivery device delivers intensified insulin therapy and is currently cleared for use with rapid acting insulin. An earlier study (Lajara et al., 2015) found a significant decrease in HbA1c after patients started using V-Go. In a continuation of this study, the use of regular insulin was evaluated in V-Go to determine impact on glycemic control, as costs of rapid insulin are increasing and less expensive alternatives are needed. The medical records of ten patients using V-Go to deliver insulin were retrospectively examined. Four of these patients were transitioned to regular from rapid insulin and six administered regular insulin from the start. Patients were examined at follow-up visits at which time HbA1c, weight, and insulin total daily dose (TDD) were recorded. Hierarchical linear models were developed to estimate A1C, insulin total daily dose (TDD), and weight. In each case, the baseline measurement of the outcome variable, the number of days on V-Go, and a dichotomous variable indicating whether the patient initiated V-Go with RHI or RAI were included as independent variables. Although this is a very small study, the results could help determine if the use of regular insulin in V-Go provides improved glycemic control while decreasing pharmacy costs.

05.18.09 Oklahoma is Not “OK”: A Study of Accidental Drug Overdoses

Murray,Cynthia *University of Central Oklahoma*

Hiddink,Seth *University of Central Oklahoma*

This study examined hospital discharges in Oklahoma for accidental drug overdoses. In the US, nearly 9 out of 10 poisoning deaths are caused by drugs and 80% of those deaths were accidental. The Oklahoma State Department of Health provided data for 2010 – 2013 (5,358 discharges). The research questions for these patients pertained to the distributions for age, race, gender, type of insurance, and region of the state. The most common drugs were identified. Death and the length of stay (LOS), indicators of the severity of the overdose, were also summarized with regard to the demographic variables. SPSS was used for graphs and statistical tests.

05.18.10 Gross Domestic Income Versus Corruption Perception Index in 2008 and 2009

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Halderman, Jason *University of Central Oklahoma*

Brenneman, Joan *University of Central Oklahoma*

While corruption is present in all economies, we wanted to determine if there is a relationship between corruption and the economy of a nation. The independent variable chosen was the 2009 Per Capita Income, Adjusted for Inflation in US dollars of the respective countries, which measures the average income per person (GDP). The dependent variable was 2009 Corruption Perception Index (CPI). This index measures the perception of corruption that is perceived to exist in a country. To analyze the data a confidence interval was used to estimate the CPI for all countries; least squares regression was used to determine if there was a linear relationship between the GDP and the CPI; and a matched pairs test was used to determine if and how the CPI changed from 2008 to 2009.

05.18.11 Analyzing the sedative effect of low quality research in anesthesiology shows many systematic reviews are still groggy

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Kollmorgen, Lauren *Oklahoma State University*

Umberham, Blake *Oklahoma State University*

Hedin, Riley *Oklahoma State University*

Vassar, Matt *Oklahoma State University*

The validity of primary study results included in systematic reviews plays an important role in drawing conclusions regarding intervention effectiveness and bears implication for clinical decision making. The methodological quality/risk of bias of primary studies should be analyzed and results conveyed in the publication. Although several methods exist for evaluating methodological quality/risk of bias, questions arise concerning the application of these tools in systematic reviews. We evaluated prevalence of methodological quality/risk of bias assessment in anesthesiology systematic reviews, examined commonly applied appraisal instruments, and noted how these were incorporated into results. We selected high-ranking anesthesiology journals based on 2014 Google Scholar Metrics h5-index rankings and searched PUBMED/Medline for reviews published since 2007. Of the initial 315 reviews, 207 were included, and 174 conducted methodological quality/risk of bias analyses. The Jadad scale was most commonly implemented to assess methodological quality/risk of bias. Sub-analysis, meta-regression and sensitivity analyses were rarely reported.

05.18.12 Error: Systematic Review Reports Outcome Overload in Pediatric Acute Lymphoblastic Leukemia

Wiebe, Jordan *Oklahoma State University*

Herrmann, David *Oklahoma State University*

Wayant, Christian *Oklahoma State University*

Nissen, Timothy *Oklahoma State University*

Blaik, Will *Oklahoma State University*

Wheeler, Denna *Oklahoma State University*

Vassar, Matt *Oklahoma State University*

Objective: The purpose of this study was to evaluate the common outcomes being reported by researchers in pediatric acute lymphoblastic leukemia in order to compare consistency across studies. **Methods:** 885 articles were acquired during our literature search from clinical databases. 295 of those articles were randomly sampled for full text review. 113 articles were excluded leaving 182 articles to be included in the analysis. Each coder independently coded ~73 articles. A second coder then determined the validity of each coded element. Discrepancies were resolved by group consensus. Outcome results were sorted and standardized into 9 domains. **Results:** Post-standardization, it was determined that 41% of outcomes reported were adverse events, 15% were survival, 13% were response, 11% were relapse, 9% were mortality, 4% were remission and cognitive events, and 3% were other outcomes. **Conclusion:** Outcome reporting in pediatric oncology has a wide variation of focus with a lack of clarity and consistency. Emphasis is placed on survival and adverse effects with little attention placed on quality of life (located in "other" domain). Guidance is needed to improve outcome reporting in a way that is beneficial and relevant to healthcare providers, patients, and researchers.

05.18.13 Evaluating the Effect of the Censoring Distribution Assumption for Case I Interval-Censored Survival Data

Cook, Tyler *University of Central Oklahoma*

Sun, Jianguo *Other*

One problem researchers often face when analyzing survival data is how to handle the censoring distribution. For practical convenience, it is often assumed that the observation process generating the censoring is independent of the event time of interest. This assumption allows one to effectively ignore the censoring distribution during analysis. Unfortunately, one cannot generally test for independent censoring without additional assumptions or information. Therefore, the researcher is faced with a choice between using methods designed for informative or non-informative censoring. This project investigates the effectiveness of methods developed for case I interval-censored data under both types of censoring. Extensive simulation studies indicate that the methods produce unbiased results in the presence of both informative and non-informative censoring. The efficiency of the informative censoring methods is then compared with approaches created to handle non-informative censoring. The results of these simulation studies can provide guidelines for deciding between models when facing a practical problem where one is unsure about the dependence of the censoring distribution.

05.18.14 Publication Bias in Dermatology Systematic Reviews and Meta-analyses

Atakpo,Paul *Oklahoma State University*

Systematic reviews and meta-analyses in dermatology provide high-level evidence for clinicians and policy makers. One methodological flaw with systematic reviews is the underrepresentation of unpublished studies. This problem, known as publication bias, is the product of researchers failing to report findings that are statistically insignificant. Omission of statistically insignificant data from meta-analyses may result in overestimation of treatment effect size. Our goal was to assess whether systematic reviewers in dermatology evaluate and report publication bias. Our study considered systematic reviews and meta-analyses from ten dermatology journals from 2006 to 2016. A PubMed search was generated and all articles that met our inclusion criteria were downloaded and coded. 293 articles were included in our analysis. Additionally, we evaluated publication bias in meta-analyses that failed to do so. Publication bias was formally evaluated in 64 articles (21.8%). Publication bias was present in 45 articles (15.3%), not present in 57 articles (19.5%) and not determined in 191 articles (65.2%). Cumulative meta-analysis by precision method found evidence of publication bias in 15 of 21 meta-analyses (71.4%) that failed to assess publication bias. Many of the reviews in our study did not evaluate publication bias. In comparison to other studies, we found that systematic reviewers in dermatology were less likely to evaluate for publication bias.

05.18.15 Graft vs. Host: Rejecting Incompatible Evidence in Pediatric Acute Lymphoblastic Leukemia Studies

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Herrmann,David *Oklahoma State University*

Wayant,C. *Oklahoma State University*

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Wiebe,Jordan *Oklahoma State University*

Wheeler,Denna *Oklahoma State University*

Vassar,Matt *Oklahoma State University*

Condensing numerous trials into meta-analyses is vital to providing meaningful information to clinicians and researchers. Fully-reported outcome elements (what is being measured, how it is being measured, and how these measurements are represented) within studies included in meta-analyses are critical to ensuring meta-analytical quality. Meta-analysis within pediatric oncology has demonstrable struggles to synthesize research: Quality has been rated one on a scale of one to seven. As a meta-analysis is only as good as its component parts, our group expected that incomplete reporting of outcomes accounted for the poor quality in pediatric oncology reviews. Through a three-step process of literature search, standardization and coding of data reported within the literature, and verification of our coding (validation of data standardization by a second reviewer), our research group assembled a data set showing the outcomes being reported in pediatric ALL studies and the completeness of their reporting. Our group found that complete reporting of critical elements was rare, with only 25% of articles thoroughly reporting their outcomes (n=182 studies); that there is a near-universal failure to designate primary outcomes (13% designated, n=182); that completeness of reporting varies between different types of outcomes (ranging from 20% complete to 100%, n=182); and that adverse event reporting in particular has room for improvement (56% of outcome elements reported, n=182).

05.18.16 The lack of complete reporting in pediatric anesthesia clinical trials

Aran, Greg *Other*

With the abundance of unique outcomes in clinical trials detailing pediatric anesthesiology studies, there lies a difficulty in establishing a set of core outcomes needed for evidence based medicine. Clinical trial registries and the systematic reviews that utilize them are extremely useful in modern day medicine, however their utilization is dependent upon the outcomes, measurements and results they provide. Incomplete reporting of results from pediatric anesthesia trials on web-based registries like Clinicaltrials.gov is extensive, which proves difficult in providing needed information to the public. Multiple systematic reviews such as the ones shown below bring to light the incomplete reporting of published clinical trials and the need for a set of guidelines studies can format from. Our research looked to determine the completeness of reporting among the clinical trials found on a popular online trial registry, Clinicaltrials.gov. We screened all studies that came up under our search of pediatric post operative pain and cross checked our screening results with other team members. After coding each article based upon the clinical trial's study designs and outcomes reported on the registry, we analyzed the completeness of reporting using statistical analysis. Our analysis found that a significant proportion of outcomes reported on clinical trials were not complete in reporting and provided results not shown on the online database.

05.18.17 A Social Network Analysis of Outcomes in Pediatric Post-Operative Pain Studies Authors: A. Ross; J.Young; A.Demand; G. Aran; R. Hedin; B.K. Carr; M. Vassar, Ph.D. Oklahoma State University – CHS

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Objective/Hypothesis: Little is known about the diversity of outcomes measured in clinical trials of post-operative pain in pediatric patients. An increase in the diversity of outcomes presents difficulties when synthesizing data for a systematic review. Therefore, the objective of this study is to explore the nature of outcomes reported in pediatric post-operative pain management clinical trials and to elucidate the outcomes most central to an outcomes network. Method: 165 clinical trials from 1999-2015 were retrieved from clinicaltrials.gov, and the outcomes from each article were extracted. The outcomes were next tabulated on a matrix to determine the co-occurrences between reported outcomes. Social network analysis was performed to identify outcomes most central to the network. Results: There were a total of 577 outcomes, with 148 being unique. Post-operative pain had the most co-occurrences among the trials (n=311), followed by Total Analgesia Post-operatively, Recovery, Time to Rescue Medication, Side Effects, Satisfaction, Length of Hospitalization, Quality of Treatment, Post-Operative Sedation Scores, and Nausea/Vomiting. Conclusion: The development of core outcome sets through a systematic review can reduce the diversity of outcomes measured across studies. Social Network Analysis is a valuable method to see which outcomes are central to trials and can help initiate the development of core outcome sets for pediatric post-operative pain management studies.

05.18.18 Is Risk of Bias or Quality Systematically Evaluated in Cardiology Systematic Reviews and Meta-Analyses?

Jaiswal,Dev *Oklahoma State University*

Vassar,Matt *Oklahoma State University*

Introduction: Evidenced-based medicine is the basis of treatment guidelines. In cardiology, systematic reviews and meta-analyses are considered level 1a evidence, therefore used to make treatment-defining decisions in the field. It is crucial for these studies to be further evaluated. The goal of the study was to investigate how Measurement Quality or Risk of Bias (MQ/ROB) plays a role in systematic reviews and how potential bias present affects the studies. Methods: Five of the most prominent cardiology journals were selected by impact factor using Google Scholar Metrics. With these journals, 282 articles were selected, screened through Covidence, and the relevant 182 articles were measured for quality. Risk of bias was graded and then further analyzed by their respective journals. Results: In this study, it was found that most authors in Cardiology do not incorporate MQ/ROB in their reviews. Of the 182 articles explored, 99 studies assessed risk of bias. Of the 99 studies, 71 found a risk of bias indicated that 71.72% have some trials with questionable quality. Conclusion: Our study suggests that most authors in Cardiology do not incorporate MQ/ROB in their reviews. When MQ/ROB was assessed, quality is often not fully displayed, leaving ambiguous results. Systematic reviews have pertinent implications of clinical guidelines and decision-making, therefore it is crucial to interpret whether these reviews maintain quality measurements.

05.18.19 A simulation study of multiple comparison procedures for differences in proportions

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This study concerns the use of multiple comparison procedures following a significant Chi-square test or Fisher's Exact test. Ten thousand 2x3 matrices of data were simulated from a binomial distribution for various combinations of n ($= 20, 50, 100, 200$) and p ($= 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9$). Three different methods were examined: the chi-square test followed by pairwise chi-square tests, Fisher's exact test followed by pairwise Fisher's exact tests, a combination of the chi-square test and Fisher's exact test when more than 20% of the expected counts were less than 5, and the chi-square test followed by Cohen's multiple comparisons (Cohen, 1967). Type I error and power were estimated for each procedure. All simulations were performed in R v.3.2.2.