hypertension studies, 2) help the VDW development efforts by clarifying data element creation rules and interpretations, and 3) document any new columns or tables in a Hypertension Registry data dictionary. All three sites had equal responsibility for registry development, documentation, and writing distributed code for quality checks rather than a lead site being designated for these efforts. **Results:** An algorithm for defining hypertension was used to create a “superset” of hypertensive patients. Using the protocol as a guide, the data team examined existing VDW tables to determine if all aims could be met with current data elements and developed solutions for additional variables or tables necessary to support planned papers. Challenges to harmonization of data elements were encountered in relation to data quality, data availability, and differing business models. Data team members gained a better understanding of the strengths and benefits of having a VDW in place, but also learned of areas where differing interpretations of the VDW data dictionary necessitated rework in the VDW or the need for better documentation. This presentation or poster will share how the team attempted to resolve these challenges in order to aid similar studies in the future. **Conclusions:** The Hypertension Registry is currently supporting at least 12 different hypertension papers and has been fully documented so that Hypertension Registries could potentially be built at additional sites. Continued discussion of VDW supported research efforts within the HMORN community is needed to learn how to best identify and create efficiencies. **Keywords:** Hypertension Registry, Virtual Data Warehouse, Algorithm for defining hypertension

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C-C1-02:

Creating a GIS Infrastructure to Evaluate Air Quality's Effect on Health Outcomes

Rick Krajenta, BS¹; Lois Lamerato, PhD¹; Jason Booza, PhD²; Alice Grgicak-Mannion³; Helen Krause²; John Reiners, PhD²; Delbert Raymond, RN, PhD⁴; Linda Weglicki, PhD, RN⁵

¹Henry Ford Health System; ²Wayne State University; ³University of Windsor; ⁴Eastern Michigan University; ⁵National Institutes of Health

Background and Aims: Air pollution exposure is a complex and heterogeneous condition. The association of air pollution with disease is consistently established in many epidemiological studies. This creates a need for an infrastructure to measure both air pollution levels and health outcomes geospatially. **Methods:** As part of the North American Public Health Institute, we developed a multidisciplinary, international research team encompassing Windsor, Ontario, Canada and Detroit, Michigan, USA. While this geographic region consists of a single air-shed it exhibits different socioeconomic conditions and health delivery systems. We deployed 100 active and/or passive pollution samplers across this common air-shed based on U.S. Environmental Protection Agency guidelines for ambient air monitoring to determine levels of gaseous (i.e., NO₂, SO₂), volatile and particulate pollutants at a resolution greater than what is currently available. We are collecting asthma-related health outcomes for the populations residing within this region using emergency room, clinic, and hospital encounters from American and Canadian health care providers. Utilizing global positioning satellite for pollution sampler allocation and geocoding technique for patient address location, we created a complex mappable system to relate air pollution components and levels to health outcomes. **Results:** Air pollution levels can be linked to asthma events by several mechanisms. The first step is to use direct measurement value of the closest sensor by creating Voronoi polygons and mapping the asthma events to that geographic area. Associations between pollution level and asthma exacerbation can be examined between these data set. Models of the pollution levels using land use regression can increase the resolution beyond the point values. Longitude/latitude coordinates can be mapped to a pollution level in the surface generated by the model. **Conclusion:** Establishing a geospatial information system (GIS) integrated database with both pollution measurements and health outcomes creates a comprehensive resource. This infrastructure is flexible enough to investigate the effects of air pollution on

many diseases, such as respiratory and cardiovascular disease, by physical and mathematic modeling. We can also compare health outcomes by health delivery system.

Keywords: Air pollution exposure, Geospatial Information System, Asthma-related Health outcomes

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C-C1-03:

Using the Electronic Health Record to Create Population Denominators: Optimization Using Insurance Enrollment

G. Craig Wood, MS¹; Jason Roy, PhD¹; Joseph Leader, BS¹; Walter Stewart, PhD¹

¹Geisinger Health System

Background and Aims: The HMORN includes research centers that are part of integrated delivery systems where the practice and insurance entities are independent (e.g., Geisinger, Marshfield). Rules for defining population denominators at these centers require acknowledging that patients in the practice population may not be members of the insurance entity. Methods for defining a population denominator for primary care patients from the electronic health record (EHR) can be validated in the subset of patients who are in the primary care system and members of the insurance entity. The aim of this study was to validate and optimize a method for calculating population denominators from the EHR. **Methods:** We proposed a method for defining population denominators from the EHR data at HMORN 2009. This method was based on describing utilization patterns of primary care patients' overtime. For this study, the cohort was limited to the subset of Geisinger primary care patients who were enrolled in the Geisinger Health Plan. Survival analysis was used to minimize bias in person-time estimates and incidence estimates. The aims were to identify optimal times from insurance enrollment to first utilization and time from final utilization to insurance disenrollment. Since the results are likely dependent upon gender and age (i.e. a typical gap in utilization will tend to be longer for young males as compared to older males), the analyses were compared across patient demographics. **Results:** To define cohort entry, the time between initial encounter and insurance enrollment was estimated using survival analysis. EHR enrollment was considered active until the patient failed to have any encounters with a primary care clinic for an age/gender specific cutoff of time. If the patient became inactive, the end date was imputed forward in time based on optimization from survival analysis using the insurance enrollment. These estimates were used to create an age/gender specific algorithm for calculating population denominators from the EHR. **Conclusions:** EHR utilization can be used to define population denominators. Validation of the proposed method was conducted by comparing results to insurance enrollment spans. This application is limited to clinical areas where there is evidence of relatively complete capture.

Keywords: Electronic Health Record, Defining population denominators, Data utilization

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C-C1-04:

How to Win Friends and Influence People with the SAS Output Delivery System

William Tolbert, MA; Group Health Cooperative

Background and Aims: Long-time SAS users remember the days when SAS output was embarrassingly ugly. Version 7 saw the introduction of the Output Delivery System (ODS). ODS has matured into a very capable subsystem that gives users powerful reporting options. This presentation will highlight useful features and outline a macro-based system for handling multiple ODS destinations simultaneously. Nowadays there is no excuse for ugly SAS output! When building reports, SAS users should think about the needs of those using the reports. Some people just want to review frequency tables, and are happy to do so on a monitor. Others want to be able to print data for review in a meeting. And, there are always those that want to work with the data in a spreadsheet. Consider the ideal formats for each of the users