10049- Backward approach for estimating physician-specific diagnostic test characteristics: a unified approach in analytical epidemiology and clinical epidemiology

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Background: Predictive values (PV) are commonly estimated indirectly, assuming standard diagnostic tests with no variations of sensitivity and specificity and known prevalence. Such estimates do not consider the physician's skills and knowledge and are often inappropriate in the clinical setting. The authors propose obtaining the PV values *directly* in a physician-specific patient population and estimating physician-specific sensitivity, specificity, and prevalence of the clinic population, based on the predictive values and rate of positive diagnostic tests for a specific clinic. Methods: PV and the overall detection rate of a medical condition, i.e., the rate of positive tests, are used to calculate the sensitivity and specificity based on Bayes' Theorem. Results: An experienced physician's positive predictive value (PPV) was 0.913 and his negative predictive value (NPV) was 0.918. Thus, the estimated prevalence of his patient population was 0.574 and the sensitivity and specificity of his clinical judgment are 0.942 and 0.878, respectively. A less experienced physician's PPV was 0.765 and his NPV was 0.963. Thus, the estimated prevalence was 0.468 and the sensitivity and specificity of his clinical judgment were 0.968 and 0.739, respectively. These characteristics were different from their sensitivity and specificity, had those been calculated directly. Conclusions: Relying on stable sensitivity, specificity and prevalence may be inappropriate when these statistics are not available for a specific physician. The indirectly calculated physician's specific sensitivity or specificity may be used to measure changes in clinical skills over time.

10139- Joint Effects of Air Pollution Mix on Emergency Room Visits for Cardiac and Respiratory Diseases in Taipei

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Abstract

Background:

The joint effects of ambient air pollution mix on emergency room visits for cardiac and respiratory diseases by age were examined in Taipei City, Taiwan for the period 1997-1998.

Methods:

Pollutants included in our analyses were particulate matter less than 2.5 and 10 μm in aerodynamic diameter ($PM_{2.5}$ and PM_{10}, respectively), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and ozone (O_3). Residuals from lagged Poisson regressions adjusting for temperature, day of the week, and temporal trends were examined and further modeled with each single pollutants. Lagged Poisson mixture-amount models were proposed to evaluate the joint effects of air pollution mix.

Results:

We found an estimated 4-6% increase in the rates of children and elderly respiratory emergency room (ER) visits for an interquartile range (IQR) change in single pollutants, except SO_2. An estimated 4-8% increase in the rates of the adults and elderly cardiac ER visits was observed for an IQR change in single pollutants, except O_3. The $PM_{2.5}$ was most responsible for the cardiorespiratory disease. The CO effect on cardiac disease was consistent with literature. The joint effects of air pollution mix were about 0-2% larger than the largest effect of the single pollutants considered.

10187- Causal regression of asthma medication use and pulmonary function.

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Evaluation of the health effects of short-term exposure to air pollution is complicated by daily asthma medication use. Most previous work has treated medication as a health outcome, effect modifier or confounder, or has ignored it all together. Medication is an important factor in the causal pathway for air pollution-related effects on asthmatics, and defining medication use as a confounder is inappropriate and can bias estimates of the effect on pulmonary function. During the months of November 2000 through May 2001, 63 asthmatic children aged 6-11 years completed two weeks of twice-daily recording of pulmonary function and symptoms with a hand-held spirometer. We applied two regression techniques to compare the estimates of the association between reported use of medication in the past hour and pulmonary function measures obtained upon waking. Contrary to expectations, simple linear regression showed use of medication in the past hour was associated with a 0.45 L/s decline in peak expiratory flow (PEF). Rather than true declines due to medication use, it is likely children who took medications were sicker than those who did not. In fact, when binary indicators for “cough or wheeze since bedtime” were included in the model, the medication estimate became -0.19 and both symptoms were associated with decreased PEF. The next approach was a weighted-regression analysis with weights inversely proportional to the probability of receiving treatment (IPTW), given asthma symptom status. This creates a pseudo-randomized treatment to remove the association between treatment (i.e. medication use) and asthma symptoms. In contrast to the earlier analysis, children who took medication in the hour before pulmonary function testing had PEFs which were 0.20 L/s higher than the unmedicated group. This corresponds to a 6% increase in mean PEF, which is consistent with improvements seen in clinical use. Similar results were seen using other pulmonary function measures such as forced expiratory flow in one second (FEV1). A simulation study confirmed that estimates from ordinary regression were severely biased, while those from weighted regression were not. IPTW regression is an important new tool for this step in the analysis of air pollution effects. Next steps include building repeated measures-adjusted confidence intervals for causal estimates and adding air pollution terms to the models. Data were obtained from the Fresno Asthmatic Children’s Environment Study (FACES), funded by the California Air Resources Board.

10229- Acceptance of a Web-based- questionnaire on respiratory symptoms in young adults - The ALOiS-Study

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Background: In a population-based survey, we assessed whether young adults living in southern Germany would make use of an online questionnaire in comparison to a traditional paper questionnaire.

Methods: The online-questionnaire was implemented in a cross-sectional study of occupational and environmental risk factors for respiratory diseases. Each of the 280 subjects (age 18 to 20 years) was randomly assigned to complete either a traditional paper questionnaire or a Web-based one. Subjects in the online group had the option of using the Web or completing the paper questionnaire. Participants of the online group who did not use the online-questionnaire were asked why they preferred the paper questionnaire. We invited all participants to take part in a lottery offering small prizes like book vouchers or stationery for each of them.

Results: The response rate was significantly lower in the online group than in the paper group (63.1% vs. 74.8% (95% CI for the difference: 7.9 - 15.5%)). Overall, only eight subjects made use of the online-questionnaire. The major reason for not using the online-questionnaire was that the subjects considered it too time-consuming (39.7%). Additionally, 27.0% of the subjects did not have Internet access at home and, although we provided them free access time at the local Internet café, they did not make use of this offer.

Conclusions: The acceptance of an online-questionnaire in population-based surveys appears to be low even in a country with an Internet coverage of 60% in young adults.

10239

Structural equation modeling in environmental epidemiology

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Observational studies in epidemiology usually trigger concerns regarding measurement error, confounding, missing data, and multiple comparisons. Widely used standard statistical techniques, such as multiple regression analysis, are only partially helpful in mitigating these possible shortcomings. However, in the framework of structural equation models most of these considerations can be incorporated, thereby providing overall adjusted estimations of associations. In these models outcome variables can be grouped into one or more categories, thus providing an overall evaluation of an exposure effect on the total outcome. This approach avoids multiple comparisons but it exploits all available information, and exposure measurement error can be taken into account. In this presentation we will illustrate the potentials of structural equation modeling in an analysis of a large data set on the health effects of prenatal exposure to methylmercury.

10319- Experience in using some methodologies of environmental epidemiology in the Russian system of the environment-health monitoring.

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Establishing and assessing cause-effect associations between potentially hazardous natural and social environmental factors, on the one hand, and population health, on the other hand, and thus laying a foundation for development of health-improving strategies, is officially called socio-hygienic monitoring (SHM). It has recently become one of the major tasks of the Russian system of the State Sanitary & Epidemiologic Control (SSEC). The Ural Regional Center for Environmental Epidemiology (URCEE) took part in several collaborative studies under the Project for Environmental Management in the Russian Federation and, besides, accumulated some experience outside this Project. Although the risk assessment (RA) methodology plays an ever increasing role in the SHM and, in particular, in our own activities, we maintain that the results of epidemiologic studies are of the highest importance for both direct environment-health linkage and further use as established exposure-response relationships in RA projects. Harvard School of Public Health and London School of Hygiene & Tropical Medicine helped us very much to acquire a know-how in some modern epidemiologic methods never used in Russia before, while some others (specifically, those based on pattern recognition mathematics) were developed by ourselves. Proposals to the SSEC for re-establishing some ambient air quality standards and for significant revision of existing approaches to environmental pollution monitoring as well as some local and regional risk management programs were based on the results of our investigations and may serve as examples of important practical outputs of environmental epidemiology studies in the Russian setting.

10492- Identifying a Population-Based Sample of Women of Reproductive Age for Environmental Studies Using a Commercial Telephone Directory

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Environmental studies examining reproductive endpoints such as spontaneous abortion or fertility often rely on very select study groups (i.e., convenience samples, highly exposed, etc.) that cannot be easily generalized to the overall population. For exposures limited to a particular group or occupation, these types of studies can be sufficient. However, a large number of environmental exposures affect the broader community. No population-based sampling frameworks exist for selecting couples at risk for pregnancy within the United States. Even sampling women of reproductive age from the general population for research purposes is a challenge. To address this barrier, we utilized a commercially available CD-ROM telephone directory to obtain a population-based sample of women aged 18-44 years. This CD-ROM telephone directory has the capability to select households based on zip code and geo-codes. A self-administered questionnaire (SAQ) was mailed to a stratified random sample (based on zip code) of 10,005 households in Erie County, New York, USA. Overall, 17% of the questionnaires were undeliverable despite using the most recent listing software and address updating services. Fifteen percent (n=1,089) of the households returned completed questionnaires, of which 35% (n=377 households) returned questionnaires completed by women aged 18-44 years. Using 1990 Census information for zip code regions, respondents were more likely to be white and to have higher median household incomes than non-respondents. Of the 377 women who completed the questionnaire, 79% were pregnant at least once, five percent reported being unable to become pregnant, and 16% never tried to become pregnant. Despite the overall low response to the SAQ, various subgroups of women of reproductive age (i.e., ever pregnant, never tried to become pregnant, and unable to become pregnant) were identified and captured in the sample comparable to the expected proportion in the study population. These findings suggest ways researchers can overcome response and selection issues within environmental studies when using commercial telephone directories, i.e., over-sample lower SES areas, account for undeliverable mail and changing addresses, and include plans for follow-up to improve response rates.

10495- Use of Discussion Groups to Investigate Recruitment and Retention Issues for a Longitudinal Study of Children's Environmental Health

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Much of what is known about successful recruitment and retention of participants in longitudinal studies is anecdotal, and the majority of the published literature addressing recruitment and retention focuses on controlled clinical trials rather than on observational studies. Researchers are often confronted with low recruitment rates, which may have serious implications for the statistical power, length, cost, internal validity and generalizability of the study. Differential retention can lead to bias in longitudinal studies if more high risk participants are lost to followup or if those who are most ill are also more likely to stay in the study. Better understanding of the most effective recruitment techniques and retention strategies for community-based environmental health research is needed, especially for studies involving children. This method development study gathers opinions from community stakeholder groups regarding recruitment and retention strategies. Sixteen discussion groups of 7-9 individuals each will be assembled across the United States. The four different types of stakeholder groups to be included are: (1) pregnant women; (2) parents of non-disabled children under 12 years; (3) parents of developmentally disabled children under 12 years; and (4) health care providers who work with children and/or pregnant women. Recruitment discussion questions address the following issues: How would they want to hear about the research study? What would encourage them to ask for more information? Should recruitment materials emphasize public health benefits or individual incentives? What would generate excitement that translates into participation in the study? Retention issues focus on: Is there a preference for monetary or non-monetary incentives? What kinds or amounts of incentives could be considered coercive? How should participants be kept informed over time? How often should subjects be contacted? What would keep participants interested over time? What are the best ways to contact individuals over time? What types of information requests or biologic specimen collection would be considered burdensome and discourage continued participation? Qualitative content from the discussions will be assembled and analyzed among the four types of groups, by geographic region, and by the demographic characteristics of the participants. Results from the 16 discussion groups will be used in planning a large longitudinal cohort study to evaluate the influence of environment on children's health and development in the United States.

ISEE abstract requirements

The abstract must be a maximum of 500 words in length, this limit includes the title and authors/affiliations. Please do not apply any special formatting (headings, non-standard margins, styles, etc.). Please use only 12 point Times or Times New Roman font. The final formatting for publication (font size, margin adjustment, etc) will be done after all submissions are collated. Your abstract file must begin with the title, followed by the authors and affiliations on the next line. Please indicate the presenting author by underlining their name. Note that during the submission process you will be asked to enter this information into the submission database as well; this will allow us to automatically produce the program and author index.

The abstract body should follow in a single paragraph, you may include tables, charts or figures. If you include tables, charts or figures, you must reduce the number of words in your submission accordingly so that the final size of your abstract is similar to a 500 word abstract.

Abstracts must be in English and should cover objectives, methods, results and conclusions. Do not include references.

In formatting your submission, the maximum 500-word abstract should contain:
(a) a descriptive title and list of all authors (indicate presenting author with underline); (b) an introduction/rationale to the study; (c) the methods used; (d) the results of the study, including data not previously published or presented at a major national or international meeting; and (e) conclusions of the study. It is NOT satisfactory to state: "The results will be discussed."

10665- Exposure assessment in studies on the chronic effects of long-term exposure to air pollution.
Krzyzanowski M, Cohen A, Katsouyanni K, Koutrakis P, Oglesby L and WHO/HEI Working Group*)

Studies on chronic effects of air pollution are essential to the estimation of the burden of disease due to air pollution. Currently the preponderance of the evidence, especially for effects on long-term average mortality, comes from studies in North America. There is an urgent need to replicate their results in Europe and other parts of the world. There are also many questions emerging from the completed American studies regarding, *e.g.,* . temporal pattern of the effects or specificity of various components of the pollution mix or their sources. These questions should be addressed by further research. The critical element of these studies is exposure assessment to air pollution. Public health relevance of the studies, their duration and costs, require that all planned studies use the best available approaches and profit from international expertise. Therefore, the WHO European Centre for Environment and Health, Bonn Office and Health Effects Institute organized a workshop, which brought together 39 epidemiologists, exposure assessment specialists and toxicologists from Europe and North America involved in design and implementation of long-term epidemiological studies or in use of their results for policy making. The workshop reviewed outstanding research questions of studies on chronic effects of air pollution and focused on the exposure assessment approaches applicable in those studies. The experiences from the on-going American and European studies served as the basis of the discussion. The participants considered the design of exposure assessment in the context of overall objectives of epidemiologic research, the use of ambient air monitoring data and air quality modeling, as well as use of additional information allowing to better describe exposure patterns of individuals and populations. The applicability of biomarkers of exposure, micro-environmental monitoring, time-activity analysis, spatial modeling and the use of GIS were reviewed. The participants discussed these issues with regard to the feasibility of available methods and data for retrospective exposure assessment in Europe. The Working Group recommended diversification of the designs and exposure assessment methods, inclusion of exposure validation studies in the design, and careful estimation of the possible errors introduced by the use of existing data. The report from the workshop, summarizing its discussion and presenting the methodological guidelines for the future studies, will be presented at the Conference.

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10808- Spatial Analysis of Lung, Breast and Colorectal Cancer on Cape Cod Using Generalized Additive Modeling

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Spatial analysis of disease risk is a potentially powerful tool for identifying environmental exposures of public health concern, generating new causal hypotheses and confirming previously known or suspected relationships. We investigated the association between geographical location and lung, breast, and colorectal cancer on Cape Cod, Massachusetts, U.S.A. We obtained individual-level information--age, vital status, smoking, family history of cancer, forty year residential history and other covariates--from a population-based case control study of permanent residents of five towns in upper Cape Cod for 1983-1986. We analyzed the geographic and covariate information with a generalized additive model. This method, discussed in a companion paper, portrays locational risk while controlling for covariates, yielding maps of the crude and adjusted odds ratios for the study area. The crude and adjusted maps were similar, indicating there was little change in odds ratio due to spatial concentration of known risk factors (spatial confounding). A global statistical test indicated that location was a significant factor in the crude and adjusted models. We initially analyzed location on an ever/never basis: any subject who ever lived in a given location could contribute to the results. In order to increase the causal plausibility of the maps, we used residential history information to address latency and length of residency. Latent periods ranged from five to fifteen years. Residency duration ranged from two or more years to fifteen or more years. Using geographic information systems, the disease maps can be combined with information on environmental exposures for further investigation of other risk factors.

10814- Correcting for selection bias in symmetric bi-directional case-crossover analyses yields correct coverage probabilities.

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The symmetric bi-directional case-crossover design has been shown to substantially control for time-varying confounding and is suitable for examining the acute effects of environmental exposures (Bateson and Schwartz, 1999). Like most epidemiologic study designs, violations of the study-base principle produce selection bias. The magnitude of this bias is typically small but in studies of the effects of air pollution on health, the size of the bias may be relevant when compared to the estimated exposure effect sizes. In symmetric bi-directional case-crossover studies, this bias can be estimated using conditional logistic regression and corrected for to yield unbiased estimators of effect (Bateson and Schwartz, 2001). While the corrected effect estimates appear to be unbiased, it has not yet been shown that the coverage probabilities of the corrected estimate are correct.

We simulated eight time series of exposure data based on either real or trigonometric functions plus some random noise. The real patterns were the patterns of hospital admissions for cardiovascular disease and for pneumonia in Seattle, Washington. The range of underlying exposure patterns included three cosine functions of time, a linearly and curvilinear increasing function of time, and a combined linear and cosine function of time. We simulated an effect of exposure equivalent to a relative risk of 1.1, and intentionally confounded the exposure-outcome relationship. We simulated 10,000 iterations of each scenario and analyzed them using conditional logistic regression. We calculated the mean regression coefficients and their 95% coverage probabilities for both the results that were and were not corrected for selection bias. The true effect of exposure corresponds to a regression coefficient of ln(1.1)=0.0953. If both the effect estimates and their variances are unbiased, then 95% of the 95% confidence intervals should contain the true effect.

We found that the mean of the uncorrected coefficients for the eight scenarios ranged from 0.0946 to 0.0984 and the corresponding coverage probabilities ranged from 91.0% to 93.5%. When we corrected each analysis for the selection bias, we found that the mean of the coefficients for the eight scenarios ranged from 0.0952 to 0.0985 and the corresponding coverage probabilities ranged from 94.3% to 95.0%.

It has been reported that the results of naive symmetric bidirectional case-crossover studies can be biased in certain situations (Lumley and Levy, 2001; Bateson and Schwartz, 2001; Navidi and Weinhandl, 2002). The results we present here imply that the naive symmetric bidirectional case-crossover results were not meaningfully affected by the selection bias – on average – but the lower coverage probabilities for the naive results reveal that some of the individual effect estimates were biased enough to pull their 95% confidence intervals away from the true effect. After correcting those results for the selection bias by the method of Bateson and Schwartz, those coverage probabilities converged on the expected value of 95%.

10997- The Role of the Target Population in Estimating Causal Effects.

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The potential-outcomes model for estimating causal effects is now a standard approach in the statistics literature. This model is based on a counterfactual definition of causation, and as a result is usually presented using special notation. A recent conceptual extension, called the causal-contrast approach, relaxes an important assumption that is almost always hidden in standard presentations of the potential-outcomes model. In that extension, the goal is to measure a causal effect of exposure on disease in a target population, i.e., the group of people about whom the scientific question asks (Maldonado and Greenland, 2002). The standard approach, in contrast, assumes that the study population (the group of people under observation) is the target population. When the study population is not the same as the target population, the causal-contrast approach estimates a different causal parameter than the standard potential-outcomes approach. This distinction is important because in practice the study population may include persons not in the target population; the experiences of such persons are used as substitutes for some or all of the unobserved experiences of the target. The study population may even include no individual from the target, e.g., the people enrolled in a randomized trial may not be the target population of public-health interest. Thus, under the causal-contrast view, a well-conducted randomized trial is not an unbiased estimator for a causal-effect measure unless the people enrolled in the trial are representative of the target population with respect to the effects under study. We present an example, and we discuss the public-health implications of this assumption.

11042- PREVALENCE OF JAUNDICE IN ANDHRA PRADESH, INDIA: FINDINGS FROM THE NATIONAL FAMILY HEALTH SURVEY, 1998-99

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Background
India's National Family Health Survey, 1998-99 (NFHS-2) in a nationally representative sample of household, collected information on a few morbidities including Jaundice.

Objectives
In this paper we aim to study the prevalence and characteristics of jaundice cases in the State of Andhra Pradesh, India.

Methods
The study analyses the reported incidence of jaundice (in last 12 months) in the State of Andhra Pradesh, which was collected from 3872 households as a part of household information in NFHS-2.

Findings
In Andhra Pradesh 1571 persons per 100,000 were reported to have suffered from Jaundice in last 12 months preceding the survey. Of those who reported to have suffered from jaundice, more than half (54 percent) were in the age group 0-15, about one-third (30 per cent) were in the age group 15-35 and rest (16 percent) were in age group 36 and above; three-fourth were from rural areas and one-fourth from the urban area; 57 percent were males while 43 percent were females. Half of these cases were from households which use tap water for drinking as against one-third which were using hand pump and rest 16 per cent were from households which were using well water or surface water (spring, river, pond, lake, etc.) for drinking. Majority of cases (81 per cent) were from the households, which did not have toilet facility in their house cutting across the socio-economic condition of the household

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Table: Percentage Distribution of Jaundice by Background Characteristics

Background characteristics	Percent suffered from jaundice	Number of cases
Age		
>=15	53.8	162
16-35	29.2	90
36 & above	16.3	49
Place of residence		
Urban	25	75
Rural	75	226
Sex		
Male	56.8	171
Female	43.2	130
Drinking water facility		
Tap	50.2	151
Handpump	33.6	101
Other	16.3	49
Type of house		
Pucca	34.6	104
Semi-Pucca	33.6	101
Kuchha	31.9	96
Toilet facility available		
Yes	18.6	56
No	81.4	245
Drink alcohol		
Yes	11.6	35
No	88.4	266