Objectives Historical exposure data reported in the literature are increasingly being used to estimate intensity in population-based studies. To develop lead intensity estimates for a U.S. case-control study, we used meta-regression models to identify predictors of personal air and blood lead concentrations for US workers performing activities related to lead-based paint and cutting or joining metal with heat using published data.

Methods From 69 published papers covering the study years 1962–2005, we extracted personal air and blood lead geometric means (GM), geometric standard deviations (GSD), number of measurements per statistic, and other ancillary exposure variables. Mixed-effects meta-regression models were developed separately for 221 air and 113 blood statistics, with the respective log-transformed GM as the dependent variable. Random intercept was incorporated that weighted each statistic by the inverse of its variance. Variables examined included year, industry, job, sampling duration, lead-based paint removal activities, worst case scenarios, and respirator use. Industry interactions with job and year were also tested.

Results Job, industry, and year were the main predictors of exposure. Temporal trends declined more in the model based on blood versus air concentrations (6.2 vs. 4.6% per year); however, confidence intervals overlapped. Exposure contrasts in the predicted GMs across the 9 jobs and 5 industries were higher in personal air (238- and 8-fold, respectively) vs. blood lead models (3- and 4-fold, respectively). Welders' blood lead GMs were 1.7 time higher in worst-case vs. non-worst case scenarios. Exposure differences from other ancillary variables were too sparse to incorporate, were insufficiently variable, or were not statistically significant.

Conclusions Time, job, and industry differences in lead exposure were quantified across many studies. The blood lead model's attenuated job exposure contrast likely reflected its integration of exposure over weeks. The steeper temporal trends for blood likely reflected the protective effect of personal protective equipment.

O47-4 A METHOD FOR CONSTRUCTING INFORMATIVE PRIORS FOR BAYESIAN MODELLING OF OCCUPATIONAL HYGIENE DATA

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In many occupational hygiene settings, the demand for more accurate, more precise results is at odds with limited resources. To combat this, practitioners have begun using Bayesian methods to incorporate prior information into their statistical models in

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with recommendations for general use.

O47-5 ASSOCIATION OF METRICS OF PEAK EXPOSURE WITH BERYLLIUM SENSITISATION

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Interday or intraday high-intensity exposures (i.e., exposure peaks) may be more relevant for initiating beryllium sensitisation (BeS); such exposures may exceed a threshold necessary to activate the immune response. This study evaluated the relationships of exposure metrics reflecting normal process variation and upset conditions with the prevalence of BeS.

In a study of workers employed from 1994–1999 at a primary beryllium manufacturing facility, exposure metrics were developed using personal full-shift measurement, 15 minutes to 24 hour process-specific area measurements, and process-upset information gleaned from historical reports. Quantitative intensity metrics included highest-ever job-specific average, maximum, 95th percentile, upper tolerance limit (UTL), exceedance fractions (>0.2 and >2 μg/m3), and the product of the geometric mean and geometric standard deviation (GMxGSD). Qualitative metrics included professional judgment of process-upsets (PJPU), and number of process-upset events (e.g., power outage). Relationships among these metrics were evaluated using Spearman correlation and their association with BeS was evaluated using logistic regression with splined and log-transformed exposures.

As anticipated, a high degree of correlation existed among metrics within full-shift measurements (rS: 0.57–0.99) and task/process measurements (rS: 0.56–0.96), and moderate correlation across the two measurement types (rS: 0.48–0.79). Most of these metrics were associated with BeS in logistic models of log-transformed exposures. In splined models, non-linear associations were observed with average, 95th percentile, UTL, and exceedance fraction > 2 μg/m3 from the personal samples. Strong associations with BeS were observed for GMxGSD (OR = 1.8 and 3.6) and PJPU (OR = 8.3 and 8.5) for medium and high categories compared to low category.

Professional judgments regarding process-upset potential and the combined GMxGSD were valuable in predicting BeS; each may reflect a different aspect of interday and intraday exposure peaks. Non-linear associations were possibly due to confounding by chemical form and/or skin exposure, use of respiratory protection, presence of a threshold and/or by genetic susceptibility.

O47-6 IMPACT OF CALIBRATING A BENZENE JOB-EXPOSURE MATRIX WITH MEASUREMENTS ON EXPOSURE-RESPONSE ASSOCIATIONS FOR NON-HODGKIN LYMPHOMA

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Objectives To provide insight into the contributions of exposure measurements to job exposure matrices (JEMs), we examined the sensitivity of exposure-response associations between occupational benzene exposure and non-Hodgkin lymphoma (NHL)

O47-5 Association of metrics of peak exposure with beryllium sensitisation

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Notes