

**Information Collection Request for
Occupational Exposures to Surgical Smoke in Veterinary Personnel**

**Request for Office of Management and Budget Review and
Approval for Federally Sponsored Data Collection**

Section B

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B. Collections of Information Employing Statistical Methods

B1. Respondent Universe and Sampling Methods

The respondent universe of interest for the proposed study includes veterinary medicine and animal care (VM/AC) personnel who are 18 years or older and currently working at a veterinary clinical facility. A convenience sample of 150 VM/AC personnel will be recruited from participating veterinary facilities for the research study. Three veterinary teaching hospitals and a national network of community veterinary clinics that were recruited during the project funding proposal stage have agreed to participate in this research. Recruitment of individual participants at these facilities will occur after a description of the study, including potential risks and benefits of participation, has been provided to the eligible VM/AC personnel at each facility.

The sample size calculation, assuming a repeated measures logistic regression with two measures per subject, power of 80%, alpha of 0.05, within subject correlation of 0.5, baseline asthma (used as the example health outcome) prevalence of 0.1, and prevalence of 0.3 in the exposed population with equal allocation, revealed a sample size required of 103 participants, to observe a difference in proportions of 0.20. While the final number of participants will in part be determined by the number of VM/AC personnel with surgery-related duties during the site visits, we anticipate recruiting up to 150 participants across all sites.

This is a new information collection request. Approval is being requested for a three-year period.

B2. Procedures for the Collection of Information

The target population for the data collections will be VM/AC personnel who are 18 years or older, speak English, and work at a collaborating clinical veterinary facility. Three veterinary teaching hospitals and a national network of community veterinary clinics, recruited during the project proposal phase, have agreed to participate in this research as field study sites. Recruitment of individual participants at participating facilities will occur after a description of the study, including potential risks and benefits of participation, has been provided to the eligible VM/AC personnel at the facility. To be eligible to participate in the study, an individual must have worked in a clinical veterinary setting at any time during the previous 12 months and be able to provide verbal informed consent. VM/AC personnel at participating facilities will have the opportunity to voluntarily express interest in participating by completing a brief expression of interest form. For each worker who voluntarily completes the expression of interest form, a NIOSH investigator will schedule a day/time (at the worker's convenience) to complete the consenting process and enrollment into the study; the NIOSH investigator will provide the potential participant the study informed consent form to review prior to administering the consent and, if the worker agrees to participate, study enrollment.

Collection of Baseline Questionnaire Data

After the participant provides informed consent, a NIOSH investigator will enroll the participant into the study and assign the participant a unique identifier. This same unique identifier will be assigned for the participant during the post-shift questionnaire (if they choose to participate) data collection. The NIOSH investigator will then administer the one-time baseline questionnaire

virtually through a secure government platform (e.g., Microsoft Teams), with questions covering demographics, work history, work tasks, potential occupational exposures, use of personal protective equipment, and health outcomes. The nature of the recruitment strategy means potential participants who express interest in participating are likely to meet the inclusion criteria of having worked in a clinical veterinary practice at any time during the previous 12 months prior to consent; however, a screening question will be administered at the start of the baseline questionnaire to ensure the worker is eligible for participation.

All NIOSH investigators administering the baseline questionnaire will be trained on the protocols required to successfully complete the data collection, including the use of the data collection software. Data from completed baseline questionnaires will be stored on a CDC approved and secured platform, with data access restricted to NIOSH staff involved in this research study.

Collection of Post-shift Questionnaire Data

The intervention component of this research is the use of a local exhaust ventilation system, called a smoke evacuation system (SES), specifically designed to reduce surgical smoke exposures during animal surgeries. SESs are standard recommendations by several authoritative organizations focused on human health for the control of surgical smoke. Based on the literature and pilot studies at least a 50% reduction in surgical smoke is expected after implementing an SES in a veterinary surgical suite.

Project staff will make two site visits to each participating facility during the project for field work. During site visit #1 (no intervention), general area air sampling for surgical smoke constituents and the post-shift questionnaire will be conducted on each day of the 5-day workweek. None of the participating facilities are currently using SESs; therefore, site visit #1 will be considered the “no intervention” condition. During site visit #2 (intervention), SESs will be deployed in surgery suites at the facility at the start of each day of the 5-day workweek. The same protocol for general area air sampling for surgical smoke constituents and conducting the post-shift questionnaire as in site visit #1 will be conducted during site visit #2; therefore, site visit #2 will be considered the “intervention” condition. The post-shift questionnaire will be used to collect information on acute respiratory, eye, and headache symptoms; work-relatedness of these symptoms; work tasks; and potential confounding factors, including use of cleaning products and animal species in the work area.

NIOSH study staff will arrive at the facility prior to the start of the work shift and work with the facility liaison to identify an appropriate location for NIOSH investigators to conduct the study activities. Participants will be offered to complete a post-shift questionnaire at the end of their work shift, either with a NIOSH interviewer who will enter data on a password-protected NIOSH computer or paper copy, whichever they prefer. All post-shift questionnaires completed on a password-protected NIOSH computer will be stored on the computer, in the possession of NIOSH staff, during the site visit. Post-shift questionnaires completed on paper will be stored in a secure lock box, in the possession of NIOSH staff, during the site visit; data from the paper questionnaires will be double-entered into onto a password-protected NIOSH computer by two different study personnel, and then the paper questionnaires will be destroyed. Skip patterns will be applied in the post-shift questionnaire where appropriate to avoid asking non-applicable

questions. The same participant unique identifier that was assigned during informed consent and baseline questionnaire administration will be used for the participant's post-shift questionnaire.

Workers who did *not* complete the study consent and the baseline questionnaire prior to site visit #1 (no intervention) will be provided a verbal and written description of the study. If they are interested in participating, informed consent will be conducted. If the participant is 18 years or older, study personnel will assign the participant a unique identifier to be used in the post-shift questionnaire. Following the site visit, a NIOSH investigator will follow up with the worker via email to schedule a day/time (at the worker's convenience) to complete the baseline questionnaire.

The post-shift questionnaire could be completed up to a maximum of 10 times per respondent over the entire course of the study (once per workday during the five-day site visit #1 [no intervention] and once per workday during the five-day site visit #2 [intervention]).

All NIOSH investigators administering the post-shift questionnaire will be trained on the protocols required to successfully complete the data collection, including the use of the data collection software. Data from completed post-shift questionnaires will be stored on a CDC approved and secured platform, with data access restricted to NIOSH staff involved in this research study.

B3. Methods to Maximize Response Rates and Deal with No Response

To obtain a sufficient number of completed questionnaires, we have (or will) take the following steps to facilitate willingness to participate:

1. Established collaborating veterinary clinical facilities – Three veterinary teaching hospitals and a national network of community veterinary clinics were recruited during the project funding proposal stage and have agreed to participate in this research. NIOSH investigators have already discussed worker participation in the study with local investigators, and these participating facilities have agreed to allow access to workers to provide them the opportunity to participate in study activities.
2. Institutional support – The participating facilities can distribute (print and electronically via email) the NIOSH-developed facility-specific study recruitment fact sheet and recruitment communication, which includes the voluntary expression of interest form, that communicate the study objectives and emphasize the importance of participation.
3. Local involvement – In addition to NIOSH investigators being available at all times to answer questions from potential participants, a local investigator at each participating facility will also be available to answer any questions from potential participants. We have designed our collaborations in this way to
4. Streamlined questionnaires – We have developed the questionnaires to be least burdensome as possible to participants by ordering questions in a logical sequence, integrating skip patterns, and asking questions that serve the study objectives and analyses.
5. Interviewer training and experience – All NIOSH staff who collect data will be trained and experienced at conducting questionnaires in a workplace setting, thus facilitating

easy of survey participation for the participant and increasing the likelihood the participant will complete the questionnaires in their entirety.

6. Participant follow up – For participants who did *not* complete the baseline questionnaire prior to study consent and enrollment during site visit #1 (no intervention), NIOSH investigators will make at least two attempts to reach the participant to conduct the baseline questionnaire.

B4. Test of Procedures or Methods to be Undertaken

The questionnaires were reviewed and discussed with researchers internal and external to NIOSH with expertise in veterinary medicine, industrial hygiene, exposure assessment and control, ventilation assessment, behavioral research, and biostatistics. These subject matter experts have experience developing questionnaires to collect information on respiratory health, occupational exposures in veterinary settings, and assessing surgical smoke exposure among healthcare workers. Consultations on the type of information to be collected began in 2021 and have continued throughout the project planning and protocol development. There were no issues with data collection methods or frequency that were unable to be resolved through this consultation.

CDC programs consulted during project development, drafting of the data collection tools, and designing of methods:

- CDC/NIOSH Healthcare and Social Assistance Program. Contact person: Megan Casey, BSN, MPH, RN, Nurse Epidemiologist, 304-644-3274, ydg7@cdc.gov
- CDC/NIOSH Respiratory Health Program. Contact person: Paul Henneberger, MPH, ScD, Research Health Scientist, 304-285-6161, pkh0@cdc.gov
- CDC/NIOSH Exposure Assessment Program. Contact person: Matthew Dahm, PhD, MPH, REHS, Supervisory Environmental Health Specialist, 513-458-7136, iwa6@cdc.gov
- CDC/NIOSH Prevention Through Design Program. Contact person: Jonathan Bach, PE, CSP, CIH, Safety Engineer, 513-533-8317, yeh6@cdc.gov
- CDC/NIOSH Small Business Assistance Program. Contact person: Brenda Jacklitsch, PhD, MS, Research Health Scientist, 513-533-8369, gwe6@cdc.gov
- CDC/NIOSH Engineering Controls Program. Contact person: Duane Hammond, MS, PE, Mechanical Engineer, 513-841-4286, ahz0@cdc.gov

Non-CDC collaborators with the following affiliations were consulted during the development of the project, drafting of the data collection tools, and designing of methods:

- Cummings School of Veterinary Medicine at Tufts University
- The Ohio State University College of Veterinary Medicine
- University of Tennessee College of Veterinary Medicine
- BluePearl Specialty and Emergency Pet Hospitals
- West Virginia University

Content of the baseline questionnaire designed for this study is based on: (1) previous work at NIOSH that identified work- and respiratory health-related data that would be relevant to VM/AC personnel (i.e., tasks, procedures, and processes specific to the veterinary industry); (2)

portions of the NIOSH Well-Being Questionnaire (WellBQ)⁽¹⁾ (pilot tested under OMB 0920-1234); and (3) the Surgical Smoke module of the NIOSH Survey of Healthcare Workers' Health and Safety Practices (OMB 0920-0860), which included questions on surgical smoke exposure and personal protective equipment used for respiratory protection.⁽²⁾⁽³⁾ Respiratory health-related questions included were drawn from standardized questionnaires: the European Community Respiratory Health Survey (ECRHS),⁽⁴⁾⁽⁵⁾ the American Thoracic Society (ATS) adult respiratory questionnaire (ATS-DLD-78),⁽⁶⁾ and the Centers for Disease Control and Prevention's National Health and Nutrition Examination Survey (NHANES) questionnaires.⁽⁷⁾⁽⁸⁾ Content of the post-shift questionnaire designed for this study is based on data collection instruments previously used in post-shift questionnaires used to evaluate occupational respiratory and eye concerns during NIOSH Health Hazard Evaluations in healthcare settings; these results are summarized in multiple publications.⁽⁹⁾⁽¹⁰⁾⁽¹¹⁾

The data collected will be used to examine (1) work-related factors that contribute to exposure to surgical smoke in clinical veterinary settings, (2) relationships between surgical smoke exposure in clinical veterinary settings and respiratory health, and (3) barriers and aids to implementing surgical smoke extraction systems that reduce occupational exposures to surgical smoke.

Data collected will be summarized using descriptive statistical methods (including means, medians, standard deviations, percentages, and frequencies), inferential statistical methods (including univariable regression, multivariable regression, and structural equation modeling), and Bayesian modeling.

B5. Individuals Consulted on Statistical Aspects and Individuals Collecting and/or Analyzing Data

Contact information for those responsible for design, collection, and analysis of survey data.

Individuals who designed the data collection

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References:

1. NIOSH (2021). NIOSH worker well-being questionnaire (WellBQ). By Chari R, Chang CC, Sauter SL, Petrun Sayers EL, Huang W, Fisher GG. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2021-110 (revised 5/2021), <https://doi.org/10.26616/NIOSH PUB2021110revised52021>.

2. Steege AL, Boiano JM, Sweeney MH. NIOSH health and safety practices survey of healthcare workers: training and awareness of employer safety procedures. *Am J Ind Med.* 2014;57(6):640–652. <https://doi.org/10.1002/ajim.22305>.
3. Steege AL, Boiano JM, Sweeney MH. Secondhand smoke in the operating room? Precautionary practices lacking for surgical smoke. *Am J Ind Med.* 2016;59(11):1020–1031. <https://doi.org/10.1002/ajim.22614>.
4. Burney PG, Luczynska C, Chinn S, Jarvis D. The European community respiratory health survey. *Eur Respir J.* 1994;7(5):954-960, <https://doi.org/10.1183/09031936.94.07050954>.
5. ECRHS. Questionnaires, protocols and instructions. European Community Respiratory Health Survey, 2014. <http://www.ecrhs.org/Quests.htm>.
6. Ferris BG. Epidemiology Standardization Project (American Thoracic Society). *Am Rev Respir Dis.* 1978;118(6 Pt 2), 1–120.
7. CDC. Third National Health and Nutrition Examination Survey, 1988–1994. Hyattsville, Maryland: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. <https://wwwn.cdc.gov/nchs/nhanes/nhanes3/default.aspx>.
8. CDC. Continuous National Health and Nutrition Examination Survey, 2007–2012. Hyattsville, Maryland: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. <https://wwwn.cdc.gov/nchs/nhanes/continuousnhanes/default.aspx>
9. NIOSH (2023). Evaluation of exposure to a hydrogen peroxide, peracetic acid, and acetic acid containing cleaning and disinfection product and symptoms in hospital employees. By Blackley BH, Virji M, Harvey R, Cox-Ganser J, Nett R. Morgantown, WV: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, NIOSH HHE Report No. 2017-0114-3357. <http://www.cdc.gov/niosh/hhe/reports/pdfs/2017-0114-3357.pdf>.
10. Blackley BH, Nett RJ, Cox-Ganser JM, Harvey RR, Virji MA. Eye and airway symptoms in hospital staff exposed to a product containing hydrogen peroxide, peracetic acid, and acetic acid. *Am J Ind Med.* 2023;66(8):655–669. <https://doi.org/10.1002/ajim.23488>.
11. Hawley B, Casey M, Virji MA, Cummings KJ, Johnson A, Cox-Ganser J. Respiratory symptoms in hospital cleaning staff exposed to a product containing hydrogen peroxide, peracetic acid, and acetic acid. *Ann Work Expo Health.* 2017;62(1):28–40. <https://doi.org/10.1093/annweh/wxx087>.