COOPERATIVE AGREEMENT CLOSEOUT REPORT

Connecticut Occupational Health Expanded Surveillance 07/01/2010-06/30/2015

Connecticut Occupational Health Expanded Surveillance U60 OH008463

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List of Terms and Abbreviations

ABLES (Adult Blood Lead Epidemiology and Surveillance)

ACBS (Asthma Call-Back Survey)

CBIA (Connecticut Business and Industry Association)

CCIA (Connecticut Construction Industries Association)

CO (Carbon Monoxide)

CO2 (Carbon Dioxide)

ConnectiCOSH (Connecticut Council on Occupational Safety and Health)

CRISP (Connecticut Road Industry Surveillance Project)

CSTE (Council of State and Territorial Epidemiologists)

CT DOL (Connecticut Department of Labor)

CT DPH (Connecticut Department of Public Health)

CT PCC (Connecticut Poison Control Center)

FRI (First Report of Injury)

MAC (Manufacturing Alliance of Connecticut)

NEC (Northeast Center for Agricultural Medicine)

NYCAMH (New York Center for Agricultural Medicine and Health)

NIOSH (National Institute for Occupational Safety and Health)

OHIs (NIOSH/CSTE Occupational Health Indicators)

OIISS (Occupational Injury and Illness Surveillance System)

OSHA (Occupational Safety and Health Administration)

OSH-PLAN (Occupational Safety and Health Planning and Action Network)

PEL (Permissible Exposure Level)

SOII (Survey of Occupational Injuries and Illnesses)

TCE (Trichloroethylene)

UConn DOEM (University of Connecticut, Division of Occupational and Environmental Medicine)

VOC (Volatile Organic Compounds)

WCC (Workers' Compensation Commission)

WHAP (Workplace Hazard Assessment Program)

Abstract

The State of Connecticut Department of Public Health's (CT DPH) Occupational Health Unit was funded by the National Institute for Occupational Safety and Health (NIOSH) for the Connecticut Occupational Health Expanded Surveillance Project, from 07/01/2010 through 06/30/2015. The specific aims for this project built on the foundation of existing occupational health surveillance, and also included new ideas to enhance existing surveillance capacity in Connecticut. Success was measured on the ability both to meet the objectives outlined in the specific aims and to build and expand those aims throughout the funding period to create the greatest impact possible on occupational public health with the awarded resources.

Longitudinal Analysis of Occupational Disease Underreporting in Connecticut through Comparison of Existing Data Sources was completed for years 2010 through 2013, in collaboration with our partners at the University of Connecticut Health Center's Division of Occupational and Environmental Medicine. Currently, analysis has been completed for all years except 2014 and 2015. CT DPH has started to receive the 2015 Physician's Reports and those reports are being prepared for fall analysis. This data analysis allowed CT DPH to better understand the scope of occupational disease underreporting in Connecticut.

Continuing Population-Based Surveillance Activities through Longitudinal Analysis of the Occupational Health Indicators for Connecticut broadened into an expanded project to further the utility of the NIOSH/CSTE Occupational Health Indicators (OHI's). Program staff compiled the OHIs for years 2008 through 2012, and presently Connecticut has a thirteen-year data set that was mobilized in early 2014 to Connecticut's Open Data Portal which is part of the Connecticut Data Collaborative, a public-private effort to improve the quality and access to policy-related data in the state.

Through Specific Aim 3: *Broadening the Scope of Duties for the Connecticut Occupational Safety and Health Planning and Action Network to Include Prioritization of Identified Occupational Health Surveillance and Intervention Goals for our State*, we utilized the findings detailed in the OSH-PLAN report to convene quarterly occupational health clinics meetings which inform interested stakeholders in Connecticut on emerging occupational health hazards, problems with existing systems and approaches potential solutions to problems.

Regional Collaboration has been a priority during the past funding period because of the importance of developing partnerships with our counterparts in other states. We have developed an excellent working relationship with other Northeast states on collaborative surveillance data analysis projects. Most recently, Connecticut partnered with the New York Center for Agricultural Medicine and Health (NYCAMH) to share Connecticut hospital discharge data for a new surveillance strategy for farming and forestry injuries.

Project funding has also allowed program staff to develop educational materials in the form of Connecticut Occupational Health Alerts. These publications address important topics in occupational health, and are directed at targeted audiences. One example was *Trichloroethylene (TCE) and Reproductive Risk* developed in 2015, this Health Alert communicates the risks presented to pregnant women and women of reproductive age when TCE air concentrations are even below the OSHA Permissible Exposure Level (PEL). Health Alerts have been disseminated through our trade partners in Connecticut.

Section 1
Highlights/Significant Findings

Longitudinal analysis of occupational illness and injury surveillance data from various sources in our state, using capture-recapture methodology, was completed for years 2010 through 2013. Analysis of this combined data set confirmed significant illness and injury underreporting (in some cases, estimates as high as 95% of cases unreported) to the Connecticut Workers' Compensation Commission and the Connecticut Department of Public Health (CT DPH).

NIOSH/CSTE Occupational Health Indicators (OHI) were analyzed and reported to CSTE for pooling with other state-based indicator data during the previous five-year funding period. Ten years of OHI data was incorporated into Connecticut's Open Data Portal, which provides open public access to data collected by Connecticut state agencies. This system will allow continued access to OHI data in future years as well.

Meetings of the Occupational Safety and Health Planning and Action Network (OSH-PLAN) were convened on a quarterly basis and the OSH-PLAN report, including the recommendations of the group, was published to CT DPH website in January 2011. The findings of this report continue to influence the form and function of our occupational health surveillance strategy going forward. We continue to convene quarterly occupational health clinic meetings, to share findings and resources with clinical partners in the state.

Connecticut continued to host the Northeast Regional Occupational Health Surveillance Meeting annually from 2011-2015. This meeting brought together all occupational health surveillance partners from the Northeast States, as well as Federal partners from NIOSH, to discuss various health topics of mutual interest, and engage in joint research projects.

Translation of Findings

Longitudinal analysis using capture-recapture estimation methodology was beneficial in identifying strategies to improve workplace illness and injury surveillance. Specifically, the Workplace Hazard Assessment Program (WHAP) was developed as a mechanism for investigation of sentinel illness and injury cases of interest reported through our surveillance system. From 2010-2015, the WHAP program conducted 19 on-site workplace hazard assessments, where program staff provided in-person industrial hygiene consultation and intervention strategies to employers and worksite health and safety personnel. In addition, approximately 75 off-site consultations were performed as well.

CT DPH has provided useful data regarding work-related injuries and illnesses to stakeholders and to the public over the past five years, in the form of Occupational Health Indicators reports. A specific example of this was our presentation of data on the elevated blood lead Indicator, to the Yale University Occupational and Environmental Medicine clinic in 2014, which resulted in a joint surveillance research project and publication in press. Another example included using data from the Employment Demographics Profile component of the OHIs to provide detailed information to the CT DPH Family Health

section, which was used to develop a Women's Health Report Card template, detailing health risks to women from different areas of public health.

The Occupational Safety and Health Planning and Action Network (OSH-PLAN) was very successful in meeting its project goals over the past five years. Recommendations from this advisory group continue to influence the form and function of the occupational health surveillance strategy in our state. CT DPH has also reestablished the occupational health clinics quarterly meetings. These meetings include discussion of occupational health topics that were listed as priorities for ongoing surveillance and research in Connecticut.

Meeting annually with our regional partners from the other Northeast states continues to provide an opportunity to develop working relationships and engage in joint projects. A recent example from the 2014 meeting is a research project CT DPH engaged in with the New York Center for Agricultural Medicine and Health/Northeast Center for Agricultural Medicine (NYCAMH/NEC) that is exploring new surveillance strategies to look at work-related illnesses and injuries to workers in the forestry and farming industries.

Outcomes/Relevance/Impact

Longitudinal analysis of occupational disease underreporting provided four-years of data that enabled us to partially understand the scope of disease underreporting in Connecticut. This data demonstrated that the number of cases received by the Occupational Illness and Injury Surveillance System (OIISS) at CT DPH is dwarfed by the estimates of the true burden of those diseases occurring in our state (1.9% in 2010, 4.0% in 2011, in 6.4 in 2012 and in 5.9 in 2013). In addition, those cases that are received are likely not a representative sample, but more likely represent the most severe cases.

With the mobilization of Connecticut OHI data to the Connecticut Open Data Portal, annually-updated Occupational Health Indicator data is now publicly available to stakeholders, including researchers, legislators, clinicians, worker advocates, and the general public. Presentation of lead indicator data to Yale Occupational Medicine clinicians led to more efficient screening for firing range use as a potential source of lead expose in their patients. Also, OHI and other occupational health surveillance data in the CT DPH Women's Health Report Card provides a data-driven educational tool focused on workplace illnesses and injuries that women experience disproportionately to men.

The CT DPH Workplace Hazard Assessment Program (WHAP) provided industrial hygiene technical assistance to close to 100 employers with sentinel cases of interest occurring in their workplaces. These investigations directly impact worker health in our state by providing guidance to employers that result in safer working conditions.

Regional collaborative work has positively impacted the health of Connecticut's workers as well. The largest impact has come from the knowledge Connecticut gains during the Northeast States Regional Meeting and in joint research and surveillance ventures with our Northeast States partners. This knowledge is regularly applied to surveillance, education, and intervention efforts in our state.

Section 2
Scientific Report

Background:

Occupational illnesses and injuries represent an array of significant conditions, some of which can impact health, livelihood, and daily activities, as well as lead to disruption in an individual's family life. The magnitude and seriousness of occupational illnesses and injuries have been highlighted through a report outlining the work of a joint NIOSH and Council of State and Territorial Epidemiologists (CSTE) Surveillance Planning Workgroup, originally submitted to NIOSH in 1999, as well as recommendations incorporated into the NIOSH Surveillance Strategic Plan. In addition, the National Occupational Research Agenda (NORA) Surveillance Strategic Goals represent an evolution in the way NIOSH views comprehensive occupational illness and injury surveillance, reflecting the data and surveillance priorities of the NORA sector and cross-sector programs, while integrating data and information from a coordinated set of complementary surveillance systems. These goals also recognize the importance of achieving an appropriate balance between national and State-based partnerships, as well as an appropriate balance among health, injury, and hazard surveillance activities.

Since 1990, when the Connecticut Departments of Public Health and Labor published the baseline report titled Occupational Disease in Connecticut, Connecticut has developed and maintained a coordinated approach for the recognition and evaluation of occupational illnesses and injuries. Progress toward such recognition and evaluation is described in a follow-up report from June 2000, titled Occupational Disease in Connecticut: Data for Action. This report also highlights Connecticut's progress toward implementing the Guidelines: Minimum and Comprehensive State-based Activities in Occupational Safety and Health, published by NIOSH in 1995.

In the years since that initial report, Connecticut has implemented activities geared toward compliance with the minimum guideline activities in occupational safety and health outlined in the original NIOSH Guidelines document, in the areas of Surveillance, Policy Development, Intervention, and Infrastructure and Resources. In addition, Connecticut, through its integrated system, has implemented several comprehensive approaches in the areas of Surveillance, Policy Development, Intervention, and Infrastructure and Resources. The vision underlying this integrated activity is that the use of data pertaining to occupational illnesses and injuries leads to action to prevent these conditions. Thus, knowledge of the occurrence and causes of occupational illnesses and injuries provides the basis for creating intervention and education programs to control hazards and reduce the prevalence of these conditions in the workforce. Similarly, Connecticut's occupational illness and injury surveillance program has already implemented many of the recommended minimum and comprehensive state-level approaches in the areas of Assessment, Policy Development, and Assurance outlined in the updated Guidelines document, published jointly by NIOSH and CSTE in 2008.

One area where significant progress toward affecting change in the health of Connecticut workers has been made over the past decade is occupational lead poisoning. With an emphasis on lead poisoning prevention and intervention programs, including the Connecticut Road Industry Surveillance Project (CRISP), the Connecticut Adult Blood Lead Epidemiology Surveillance Program (ABLES), and the OSHA Lead in Construction Standard, there has been a steady decline in the number of lead poisoning cases in Connecticut over the period 1996-2006, even while reports of other conditions have increased. Similar efforts are currently underway in Connecticut to address the areas of other heavy metals exposures, work-related burns, and injuries and illnesses occurring in young workers, older workers, and non-English speaking workers. It is our goal that these activities will lead to improved hazard control and subsequent decreases in the occurrence of these conditions, similar to those seen for adult lead poisoning.

Specific Aims:

Specific Aim 1. Continue longitudinal analysis of occupational disease under reporting in Connecticut through comparison of existing data sources

Background and Methods

The Connecticut Occupational Illness and Injury Surveillance System (OIISS) is the primary source of occupational disease data utilized by the Connecticut Department of Public Health (CT DPH) to track occupational illnesses and injuries affecting workers in the state. Connecticut State Law requires reporting of occupational illness and injury cases by all practicing healthcare providers within 48 hours of diagnosis.[i] The OIISS serves as a computerized database for physician reports of occupational illnesses and injuries received by CT DPH. As part of our state's previous Fundamental surveillance grant, funding was provided to our research collaborators at the University of Connecticut Health Center Division of Occupational and Environmental Medicine (UConn DOEM) to perform comparisons of the OIISS data with other existing data sources. Even prior to the existence of NIOSH funding for occupational health surveillance in Connecticut, similar analyses specific to musculoskeletal disorders had been performed very successfully by this group.[ii] To perform these comparative analyses, capture-recapture methodology is used to determine the amount of overlap in identified cases and the extent to which cases fail to be captured by one or more of the existing systems. Capture-recapture methodology provides estimates of the number of unreported cases of a disease condition by comparing the number of case reports to two different data collection systems (such as Workers' Compensation first reports of injury compared to physician reports). It provides a well-established epidemiologic method for estimating the extent of incomplete ascertainment of cases on a population level.[ii-xi]

As part of our basic occupational health surveillance activities for this project, we continued annual comparison of the OIISS data with employer First Report of Injury (FRI)

data maintained by the Connecticut Workers' Compensation Commission (WCC) to determine the extent to which cases are under-reported to these two data systems. The WCC maintains a complete database of FRI data in electronic form. Illness and injury reports from the OIISS will be cross-referenced with data from the WCC to determine the level of overlap in case identification between these data sources

Results and Discussion

All activities under this specific aim were successfully completed during the funding period. Capture-recapture methodology was used to estimate the level of underreporting of occupational diseases through comparison of OIISS data with data from the Connecticut WCC for years 2010-2013. Generally speaking, capture-recapture is a statistical method that utilizes maximum likelihood estimation to approximate total population size based on two independent population samples. For the purposes of occupational disease surveillance, the methodology allows for an estimation of the extent of underreporting of certain conditions based on reporting data from two sources containing potentially overlapping records, where a higher amount of overlap indicates fewer underreported cases. This methodology has been utilized successfully in the past for various occupation-related health events.

Capture-recapture analysis for 2010 data found that 109 cases of occupational disease cases were reported to both the OIISS and Workers' Compensation system (9 lung, 53 MSD, 16 skin, and 3 other). This generates an unadjusted estimate of 33,095 unreported occupational illnesses (in addition to the 6,627 unique cases reported to at least one system) for a total estimate of 39,504 cases. This estimate results in an estimate of 14.6% of occupational disease cases being reported to Workers' Compensation, and only 1.9% of cases reported to the OIISS.

Capture-recapture analysis for 2011 data found that 259 cases of occupational disease cases were reported to both the OIISS and Workers' Compensation system (24 lung, 154 MSD, 37 skin, and 37 other). This generates an unadjusted estimate of 18,879 unreported occupational illnesses (in addition to the 6,661 unique cases reported to at least one system) for a total estimate of 25,799 cases. This estimate results in an estimate of 24% of occupational disease cases being reported to Workers' Compensation, and only 4% of cases reported to the OIISS.

Capture-recapture analysis for 2012 data found that 318 cases of occupational disease cases were reported to both the OIISS and Workers' Compensation system (30 lung, 165 MSD, 32 skin, and 66 infectious). This generates an unadjusted estimate of 21,104 unreported occupational illnesses (in addition to the 7,129 unique cases reported to at least one system) for a total estimate of 28,233 cases. This estimate results in an estimate of 22% of occupational disease cases being reported to Workers' Compensation, and only 6.4% of cases reported to the OIISS.

Capture-recapture analysis for 2013 data found that 460 cases of occupational disease cases were reported to both the OIISS and Workers' Compensation system (28 lung, 163 MSD, 40 skin, 196 Infectious and 33 other). This generates an unadjusted estimate of 19,693 unreported occupational illnesses (in addition to the 7,662 unique cases reported to at least one system) for a total estimate of 27,355 cases. This estimate results in an estimate of 20.4% of occupational disease cases being reported to Workers' Compensation, and only 5.9% of cases reported to the OIISS.

The CT DPH Occupational Health Program continued to work with a software developer in 2010 and 2011 to streamline and modify an electronic disease reporting system that has been used to manage report cases of occupational disease in the state. This disease-reporting module has an electronic reporting form similar to the paper forms that are still presently used. The benefit of this type of electronic reporting system will be the availability of "real time" data. Prior to this system, there were barriers that delayed CT DPH from receiving occupational disease cases in a timely fashion. This electronic reporting system has partially remedied that problem, and reduced the likelihood of reporting errors as well. This new electronic data tool is now the primary data management tool for physician reports of work-related illness and injury. This disease reporting system has replaced the older Microsoft Access-based system; but is not yet utilized to full capacity. Future plans include utilizing this data system for remote data capture from occupational medicine clinics in the state. CT DPH met with individual occupational health clinics to discuss interfacing and overcoming logistic barriers that may exist; this occurred in early 2011.

Limitations and Conclusions

The most significant limitations experienced were related to delays in processing Physicians' Reports at the Connecticut DOL and the timely ability to perform case data entry at CT DPH. Currently, normal reporting flow has resumed, and accurate case counts should remain reflected in the next reporting period. This initial delay early in the project period impacted capture-recapture analysis between CT DPH and our partners at UConn DOEM, and significantly impacted the CT DPH investigations due to the inability to identify new workplace illnesses and injuries and the worksites requiring intervention. Ideally, paperless reporting would eliminate this barrier; however financial, technical ability of clinics and logistic problems have been encountered when attempting to implement the electronic disease surveillance system statewide to utilize it for electronic data reporting. Problems such as individual clinics inability to easily interface with the system, and staffing issues at clinics have been the roadblocks encountered throughout this process. Internally to get our disease reporting system ready would require funding and consultation hours that are not available presently. The benefit of this type of electronic reporting system would be the availability of "real time" data reported to CT DPH and DOL. CT DPH hopes to overcome these roadblocks by discussing the benefits of the "real time" data with the funded Connecticut occupational health clinics at our quarterly meetings. In addition CT

DPH staff will work internally to solve the cost aspects associated with getting the disease module ready for electronic data uploads.

Limitations in the processing of Physicians' Reports at CT DOL was recently overcome by CT DPH and CT DOL developing a plan to code back-logged data and expedite delivery to CT DPH once staffing issues at CT DOL were resolved. This resulted in CT DPH receiving all of 2010 and most of the 2011 data.

Specific Aim 2. Continue longitudinal analysis of the occupational health indicators for Connecticut

Background and Methods

Funding through our previous Fundamental Program grant has allowed the Connecticut DPH Occupational Health Program to participate with other NIOSH funded states in compiling the CSTE/NIOSH Occupational Health Indicators on an annual basis. To date, we have completed analysis of state-specific data for all 22 Indicators and the Employment Demographics Profile, for the years 2000 through 2012. A summary data report for the occupational health indicators in Connecticut titled Putting Data to Work in Connecticut: A Five-Year Review of Occupational Health Indicators, 2000-2004 was published to the CT DPH website in 2008. In addition, over the course of our previous five-year grant period, we have participated with several of the other funded states in the Northeast region on more in-depth analyses for specific indicators.

As part of our basic occupational health surveillance activities for this project, we continued analysis of all of the original 19 Occupational Health Indicators and the Employment Demographics Profile information on an annual basis. In addition, we will also began including data for three new indicators Work-Related Low Back Disorder Hospitalizations, Asthma Among Adults Causes or Made Worse by Work, and Work-Related Severe Traumatic Injury Hospitalizations into our state's occupational health indicator data set submitted to CSTE annually. These new indicators were developed by our partner states in during the project period and approved for inclusion in the Occupational Health Indicators package by Connecticut and the other Consortium of Occupational State-based Surveillance (COSS) states.

Maintenance of our activities related to the Occupational Health Indicators provided us with a comprehensive method of surveillance for overall occupational health within our state. In addition, funding for this activity allowed us to maintain continuity with our inter-agency contacts from whom it is necessary to obtain data for specific indicators. Utilization of the occupational health indicators "how-to" document on an annual basis also provided an opportunity to perform a review of the indicator methodology provided in the document and to suggest changes and/or updates as appropriate.

In addition to providing data annually to CSTE, or to another data repository designated by NIOSH, on the 19 original Occupational Health Indicators, the additional indicators (Work-Related Low Back Disorder Hospitalizations, Asthma Among Adults Caused or Made Worse by Work, and Work-Related Severe Traumatic Injury Hospitalizations), and the Employment Demographics Profile, we prepared ten years of indicator data and published it to the Connecticut Open Data Portal. The Connecticut Open Data Portal is part of the Connecticut Data Collaborative, a public-private effort to improve the quality of, and access to, policy-related data in the state. In February 2014, Connecticut's Open Data Initiative was launched by executive order. Shortly thereafter, CT DPH's Occupational Health Program mobilized 10 years of OHI data to the Connecticut Open Data Portal to support this initiative. The efforts of state-based surveillance grantees in developing and calculating the OHIs data over the past decade resulted in this data being the first set of retrospective health outcome data to appear on the Connecticut Portal. This data report includes the most recent indicator data available as well as data from a number of previous years. In addition to providing data regarding the occupational health of the workforce in our state, the Occupational Health Indicators data on the Open Data Portal served to introduce the overall concept of indicators and specifics regarding the Occupational Health Indicators to our inter-agency partners, other external stakeholders, and potential data end-users.

Although not outlined as a current specific aim, as part of our past Fundamental Program activities, we conducted expanded surveillance activities for occupational asthma and mercury poisoning using the active contact algorithm already developed. Data collected as part of the expanded surveillance activities for occupational asthma, and mercury poisoning is entered into an electronic database and analyzed on a quarterly basis to determine trends and to help target interventions and educational activities. The data collected through our occupational asthma expanded surveillance activities helped us to better target educational and intervention efforts to prevent new cases of work-related asthma in potentially problematic workplaces not yet identified. In addition, reports of work-related asthma are shared with the CT DPH Asthma Program; where they use this data to drive their own intervention activities and also include findings in reports that may reach stakeholders that are separate from those encountered in the Occupational Health Program. A summary report from each analysis was generated and distributed internally to assist with targeting activities.

Results and Discussion

CT DPH compiled OHI data for 2008 through 2012 and submitted data to the Council of State and Territorial Epidemiologists (CSTE) annually each June. Ten years of OHI data was compiled and formatted in 2013 to be posted as a dataset to the Connecticut Open Data Portal. By providing access to OHI's data through the Connecticut Open Data Initiative, we are provided our stakeholders; including workers, employers, unions, trade associations, and legislators with valuable data they can use to inform decision-making and

policy formation in the future. The OHI data for the Connecticut Open Data Portal is updated regularly as new data becomes available and incorporated into the existing dataset. Due to the long history of calculating the CT OHIs, CT DPH decided it would be appropriate to combine the data from the existing CT OHIs five-year report into the ten-year Open Data Portal dataset. Presently, Connecticut's five-year web report is published to the CT DPH website [xiii].

Sharing the OHI's with other programs internally and partners in Connecticut continued to be a priority. Yale Occupational Medicine invited staff from the CT DPH Occupational Health Program to present lead data in fall 2014 to clinical staff. They were particularly interested in data from Indicator 13, *Elevated Blood Lead Levels (BLL) Among Adults*. CT DPH presented this data along with changes in the number of reports that were reported where firing range exposure was the cause of lead poisoning. We now have an ongoing relationship sharing important cases with one another on a as needed basis. We continued to share data with other CT DPH programs such as the Injury Community Planning Group (ICPG), and indicator data was shared to help set department priorities and goals in the past.

In addition to the outlined specific aim, a more extensive project was developed during the past reporting period, focusing on utilizing the CT OHIs methodology and data to help develop a women's health report card in partnership with the Family Health Section of CT DPH. This report card used data from the OHI's to come up with occupational health priorities for women. This report card will be finalized in early 2016 and will have an occupational health section along with other sections from other programs at CT DPH. In addition Demographic Profile gender distributions were utilized in preparing the percentage of the CT workforce that is male and female.

CT DPH continued to conduct heavy metals surveillance and work-related asthma surveillance from 2010 through 2015. The success of these activities is measured by the ability to identify cases of work-related mercury poisoning and also cases of work-related asthma that could be prevented by conducting Workplace
Hazard Assessment Program (WHAP) investigations. We continued our surveillance for mercury poisoning and work-related asthma for 2010 through 2015. From January 1st 2010 until June 30th 2015, there were 695 cases of mercury poisoning that were $\geq$ 1.5 ug/dL, and of those 695 reports 83 reports were $\geq$ 3.0 ug/dL. Of the 83 reports $\geq$ 3.0 ug/dL only two cases were found to be work-related. There were 78 cases of occupational asthma reported to the CT DPH Occupational Illness and Injury Surveillance System (OIISS) from 2010 to 2015.

Limitations and Conclusions

The methodology for this specific aim was based on the currently available OHI "how-to" document, developed by the participating pilot states in conjunction with NIOSH

and CSTE. Although this has proven to be a very useful document to this point in collecting indicator data, the "how-to" guide has become less useable over time as data sources have changed and website links continue to become outdated. This limitation was minimized through a central point of contact for states to report problems they encounter over time in using the OHI "how-to" document. Publishing data to the open data portal has presented difficulties mainly due to external approvals that need to take place prior to publishing data. This may result in delays in the timeliness of new data posted to the portal.

An additional methodological issue with the activities surrounding the indicators described above for Connecticut was our ability to easily obtain data in a timely fashion from our available sources. Difficulties such as these have not delayed the delivery of the most recent indicator data sets. One way this limitation was overcome was by states ability to continue to develop comparable methodology to extract the data needed to compile the OHIs. This allowed participating states to avoid delays in calculating data.

Specific Aim 3. Broaden the representation and scope of duties for the Connecticut Occupational Health Advisory Group

Background and Methods

Previous funding for Fundamental Program activities has provided CT DPH with the opportunity to convene the Connecticut Occupational Safety and Health Planning and Action Network (OSH-PLAN), a 15-member workgroup that has provided a sounding board for issues related to occupational injury and illness surveillance in Connecticut. This workgroup has met quarterly and includes representation from CT DPH, the Connecticut Department of Labor, the Connecticut Workers' Compensation Commission, our academic partners from the UConn DOEM, private insurers, industrial hygiene consultants, the Connecticut Business and Industry Association, and the legal community. The main focus of the quarterly meetings of this workgroup to date have been identifying where occupational illness and injury surveillance gaps may exist in the state, identifying potential opportunities for addressing occupational health conditions and hazardous occupations and industries, and recommending possible intervention and education activities to be developed. In addition, in 2009 the OSH-PLAN group developed a list of recommendations for ongoing or new surveillance, intervention, and education initiatives to be instituted by CT DPH in the future (see Appendix A).

As part of our basic occupational health surveillance activities for this project, we proposed to again broaden the scope of duties for OSH-PLAN to include prioritization of the recommendations for surveillance, intervention, and education identified by the group. The OSH-PLAN continued to meet on a quarterly basis through the re-establishment of the occupational clinics meetings and its duties will now include utilizing their previous work of discussing data gaps and delivery of specific recommendations regarding necessary changes to program activities or legislation to protect worker health in our state toward

setting state-specific priorities for enhanced or newly-developed occupational health surveillance, intervention, education, and/or legislative activities. These occupational health priorities were summarized in a written report that has been used to further inform our State-agency and Federal partners, legislators, and other stakeholders within our state of the needs of the occupational public health community in Connecticut.

Results and Discussion

The goals outlined for OSH-PLAN have been completed during the funding period. Recruitment and retention of workgroup members was successful and there was only minimal membership loss. The detailed final OSH-PLAN report was completed in late 2009 and presented OSH-PLAN recommendations which included priority occupational health conditions, existing and emerging occupational health hazards, problems with existing systems and approaches. Another outcome of the workgroup recommendations included, reestablishing the Connecticut occupational health clinics' meetings. In the past, these meetings brought together occupational health providers and other stakeholders in Connecticut to discuss and present on current occupational health topics. Reestablishing the Clinics' meetings was a successful outcome and these meetings are now held quarterly by each of the funded Connecticut occupational health clinics. The first Clinics' meeting convened on February 27, 2012, and focused on Integrating Health Promotion and Occupational Health and Safety. After the initial meeting, subsequent meetings were held quarterly each time at a CT DOL funded clinic location. Examples of meeting discussion topics included a September 2012 meeting focusing on the current issues with indoor air quality and health, the spring 2013 meeting discussed hazmat PE standards and the implications for firefighters. In June 2013 a meeting convened where a clinic presented on Work-related asthma and polyurethane spray foam. Part of the utility of these meeting has also been to provide feedback from the State CT DPH to stakeholders, funded and auxiliary clinics. An example of this included the clinics group inviting CT DPH to present feedback data to the clinics during the October 2013 meeting.

The implementation phase of the OSH-PLAN recommendations report is currently ongoing. OSH-PLAN has identified the Connecticut stakeholders where the greatest results would be achieved. Delivery to Connecticut stakeholders including legislators will continue through occupational health clinics meetings.

Limitations and Conclusions

Our ability to successfully broaden the representation and scope of duties of OSH-PLAN and to re-establish the occupational health clinic meetings was dependent on the willingness of the identified stakeholders to actively participate in the group on an on-going basis. One difficulty as with any advisory group or consortium was sustaining the initial interest in the mission of the group on a long-term basis, in this case for a five-year period. We believed the goal-oriented nature of OSH-PLAN initially and the relevance to the occupational clinics during these meetings helped to sustain the interest level and work

of the group throughout the funding period. Scheduling of clinic meetings has also been an issue in convening regular meetings. Physicians who hold these meetings also see patients and this new additional responsibility interferes with patient care. The group has seemed to overcome this barrier by scheduling meetings very early in the morning before the time of patient appointments at the clinics.

Specific Aim 4. Maintain regional collaboration with occupational health partners from the other Northeast states on specific surveillance activities, including expanded analysis of selected occupational health indicators

Background and Methods

The Occupational Health Program in Connecticut has had a long-standing working relationship with the occupational health programs in our partner states in the Northeast region. As we began our efforts to build capacity for occupational disease surveillance in our state, we found these relationships to be critical to our understanding of the core functions of programs in the more established states and the common struggles of our partner capacity building states. Now that occupational health surveillance activities have been established in Connecticut, we continue to find these working partnerships with the Northeast states' occupational health programs to be a rich source of information and ideas for effectively maintaining and expanding our programmatic activities going forward.

In addition to periodically working with other states on regional projects, for the past 24 years Connecticut has hosted the *Northeast Regional Occupational Illness and Injury Surveillance Conference*, which is organized collectively with our partners at the UConn DOEM and supported through occupational health funds from the Connecticut and Massachusetts Departments of Public Health. This meeting is held each spring in Chester, CT and brings together our occupational health program partners from the Northeast states, partners from other state-agencies, research partners, and advocacy groups from the region, and our Federal partners from NIOSH and OSHA. These meetings give the states involved an opportunity to present the work our programs produce every year and to learn about activities happening in other states that may translate well to their program goals.

We had proposed to utilize a portion of the basic occupational health surveillance funding provided through this grant to support the *Northeast Regional Occupational Illness and Injury Surveillance Conference* on an on-going basis. During this time of change and tenuous resources in many of the state-based occupational health programs in the Northeast, collaboration among partners in the region is increasingly critical. Funding through this mechanism to support the continued success of the *Northeast Regional Occupational Illness and Injury Surveillance Conference* ensured a sustained source of information and collaboration for occupational health surveillance programs in the Northeast states as well as our Federal partners.

Meetings of the Northeast states occupational health programs often spawn ideas for various regional surveillance projects. At the 2003 meeting, the group collaborated on a project to further examine data for *Indicator #13: Elevated Blood Lead Levels among Adults*. Data from the participating states was compiled and analyzed to attempt to determine the cause of variation among states that based on their regional proximity and similarities in industries and population demographics should have similar lead exposures for adults. The results of that study showed that much of the variation is likely due to the effect of a small number of companies in selected states with very high occupational exposures to lead (such as battery manufacturers) as well as coding variations among the different states. In addition, as part of our current Fundamental Program activities, CT DPH is leading a workgroup that includes representatives from three other Northeast states (MA, NJ, NY), which has performed a more in-depth analysis of *Indicator #6: Hospitalizations for Work-Related Burns*. This expanded analysis included detailing demographic characteristics for these hospitalized burn cases as well as an analysis of cost data associated with these hospital stays.

As part of our basic occupational health surveillance activities for the past project, we had proposed to continue to collaborate with other state-based occupational health surveillance programs in the Northeast region on a quarterly basis to further evaluate individual occupational health indicators for which a large amount of inter-state variation is present. This regional examination of the occupational health indicators will benefit not only the Northeast states in helping us to pinpoint differences in our systems for data collection that may warrant standardization but also NIOSH and CSTE as they consider possible revisions to the *Occupational Health Indicators* methodology and the supporting "how-to" documentation over time.

In 2006, the CT DPH Occupational Health Unit developed and implemented the Workplace Hazard Assessment Program (WHAP). WHAP is a resource that offers Connecticut employers confidential, non-regulatory, on-site evaluations to address health and safety concerns in their workplaces. This program offers employers no cost evaluations designed to assist employers with identifying potential workplace hazards and to provide employers with recommendations for implementing or improving appropriate controls to enhance their existing health and safety efforts. These non-regulatory on-site evaluations are designed both to assist Connecticut employers with identifying potential workplace hazards and to provide recommendations for implementing or improving appropriate controls to enhance their existing health and safety efforts. WHAP services are offered to employers, collective bargaining representatives/unions officers, or physicians treating a current employee. In addition, using data from the OIISS, CT DPH identifies companies and establishments where workers would benefit from a WHAP consultation.

Results and Discussion

Measures of success for this specific aim were reflected in our ability to convene the *Northeast Regional Occupational Health Surveillance Meeting* each year as well as in the

number of State, Federal, and non-governmental partners participating in the meeting. Connecticut has been successful every year in convening this meeting, and in more recent years this conference has been expanded an extra day to allow partners at the State to hold meetings relating to young workers and on industry and occupation coding. The level of new information and innovative work presented by various partners at this meeting was a useful evaluative measure not only of the success of the meeting but also of the success of individual states in sustaining capacity for occupational disease surveillance. In addition, this conference allowed regional partners to meet to work on past collaborative projects such as the burns regional project. Our ability to perform expanded regional investigation of selected OHIs was evaluated on an on-going basis through the discovery of causes of regional variation in indicator data and our ability to reach consensus on how to better standardize systems for data collection across the region. In addition, the degree to which the Northeast states as a group can make recommendations to NIOSH and CSTE regarding changes and updates to the OHIs in general, and the "how-to" document specifically was a valid measure of the success of these regional collaborative activities. Fundamental Program funding has provided some support for the *Northeast Regional Occupational Health Surveillance Meeting*.

During the 2011 meeting, CT DPH presented on Connecticut's utilization of real-time Poison Control Center (PCC) data for sentinel event identification and investigation "Case-Based Surveillance with Poison Center Data". In addition CT presented an analysis on young worker injuries and illnesses. The 2011 meeting also allowed for us to discuss and share the newly implemented protocols for utilizing use CT PCC data to drive WHAP investigations.

During the 2013 meeting Connect in collaboration with Massachusetts presented on the issues and barriers associated with occupational disease underreporting in a session "*Consideration of Underreporting in our data"* This regional presentation addressed some of the issues commonly seen in reporting on a State level and on a National level especially relating to data in the Survey of Occupational Illnesses and Injuries (SOII). In addition, at the 2013 meeting Connecticut presented a session on an important WHAP investigation where Connecticut assisted an out-of-state ferry company with occupational safety issues.

At the 2015 Northeast States meeting, Connecticut presented *"Hotwash and Hogwash"*, a session on Ebola experiences and preparing for the next workplace infectious disease crisis. This presentation allowed for brainstorming on what states can do to prepare for and how to respond in the event of a similar type of future disease outbreak.

The CT Occupational Health Program performed 19 on-site Workplace Hazard Assessments from 2010 through 2015 and 47 telephone consultations over the same period. Examples of WHAP investigations included an on-site assessment that was completed at an elementary school based on an odor complaint from a group of teachers at the school. Indoor air quality was tested at the school for VOCs, CO and CO2. None of the findings were indicative of poor indoor air quality and no remediation recommendations

were made based on the findings. Another assessment involved a Connecticut indoor firing range. The Occupational Health Program received a call related to a letter sent to the range outlining the OSHA standards that indoor gun range owners must comply with. Based on this letter, the owner of the range requested the services offered through WHAP to assist in identifying and correcting safety and health standards applicable to the range. Serious workplace issues were observed at the range and a recommendations report was prepared detailing the issues of ventilation, lack of personal protective equipment, and equipment storage.

The template for the woman's health report card is an example of a collaborative project that was coordinated between the CT DPH Occupational Health Program, and the CT DPH Family Health Section. The Woman's Health Report Card occupational health template was developed to educate women about workplace illnesses and injuries pertaining to occupational health, particularly illnesses and injuries that they experience as a disproportionately higher rate than in men. This template set the format for the rest of the report card which will include data from other programs within the agency such as Sexually Transmitted Diseases, Woman Infants and Children, and Chronic Disease. The Woman's Health Report Card is being currently developed with publication slated for winter of 2016. (Appendix B.)

The CT Occupational Health Program continues to publish Occupational Health Alerts on an as needed basis. Occupational Health Alerts are a short targeted publications developed as occupational health hot topics emerge. From 2010 through 2015, the Occupational Health Program published Health Alerts that were developed and delivered to targeted audiences in Connecticut. In the winter of 2007, the first Occupational Health Alert was published, focusing on carbon monoxide dangers associated with the use of gas-powered engines in enclosed areas. This Health Alert led to a long standing relationship with the Connecticut Construction Industries Association (CCIA) which has allowed us to deliver educational materials to over 600 workers in Construction and similar trades.

Since the initial 2007 Health Alert, 12 additional Health Alert publications have been published and distributed to various stakeholders and trade groups in Connecticut. These groups and stakeholders are able to distribute the materials to at-risk populations and allow for these publications to reach the greatest number of workers.

CT DPH published the Health Alert Limiting Worker Exposures to Asbestos-*Containing Vermiculite Insulation,* in fall 2010. This Health Alert was directed at residential construction workers and municipal building officials, and included information about the appropriate respiratory protection to wear when working with vermiculite. The Health Alert fact sheet was distributed to municipal building officials, and was also sent through the CCIA to their residential construction companies. (Appendix C.)

Directive to Protect Residential Construction Workers from Falls was redone in 2013 and was aimed to prevent fatalities from falls for construction workers. Falls are the leading

cause of death for workers in construction. This Health Alert detailed the number of fatal falls in construction and discussed the new OSHA directive requiring residential construction employers to use conventional fall protection for their workers, withdrawing an interim policy which allowed them to use alternative procedures for fall protection. This Health Alert was distributed to all municipal building departments in Connecticut and it was distributed as an insert to building permits issued by towns. In addition the Health Alert was shared with the CBIA for distribution. (Appendix D.)

The fall 2013 Health Alert *Hydrofluoric Acid a Penetrating Poison,* focused on the dangers of hydrofluoric acid exposure in manufacturing, industrial and laboratory facilities. This Health Alert was published after a Connecticut worker was burned on his hands and fingers from using an aluminum brightener to remove rust spots from a commercial trailer. This Health Alert detailed routes of exposure and the potential health effects from being exposed to hydrofluoric acid. This publication was distributed to the CBIA and the MAC in October of 2013. (Appendix E.)

In the summer of 2013 CT DPH developed a Health Alert *Safe Handling and Storage of Pool Chemicals.* This Health Alert was developed to communicate the risks acute exposures to dust and gases from chlorine containing pool chemicals can present to swimming pool operators and maintenance staff. The chemicals used to treat water in public and private pools can lead to respiratory injuries, asthma exacerbations and eye and skin irritation. This Health Alert was distributed to the Pool and Spa Association of Connecticut, ConnectiCOSH and the Young Worker Health and Safety Team. (Appendix F)

In the winter of 2015 CT DPH developed a Health Alert *Trichloroethylene (TCE) and Reproductive Risk.* This Health Alert was developed to communicate the risks presented to pregnant women and women of reproductive age when TCE air concentrations are below the OSHA Permissible Exposure Level (PEL). This Health Alert was shared with the Manufacturing Alliance of Connecticut (MAC), the Connecticut Council of Occupational Safety and Health (ConnectiCOSH) the Connecticut Business and Industry Association (CBIA) and through our continued partnership with the CCIA, CT DPH delivered this health alert to over 500 CCIA newsletter subscribers, as well as to over 100 CCIA members who subscribe online. (Appendix G)

A *Connecticut Young Worker Safety Team* fact sheet focusing on the prevention of young worker injuries, a background on the scope of young worker injuries, and a comprehensive list of resources for young workers was completed in August 2013. This fact sheet was shared with young workers, employers, and other stakeholders. This fact sheet was posted to the CT DPH website in late-2013. The distribution of this fact sheet included the CCIA and at Career Day at Wesleyan University. (Appendix H.) In addition, all Connecticut Occupational Health Alerts have been posted on the DPH website in order to allow for easier accessibility by the targeted audience as well as other stakeholders.

The Occupational Health unit continued to analyze Connecticut Poison Control Call Center (CPCCC) data to identify exposure cases. Two-years of occupational exposure calls received by CPCCC were analyzed to identify cases that met the investigational guidelines. The criterion for case investigation is based on confirmation of occupational exposure, caller type, severity of hazard, and cause of exposure. Calls from non-health care providers or employers are excluded, to maintain confidence in the confidential nature of PCCC services. Of the 352 calls from HCP/Employers, 19% (67) were investigated with 41 completed and 26 lost to follow-up (unknown employer, refusal of HCP to provide information, out of state employer). A presentation on this project was given at the Consortium of Occupational State-Based Surveillance (COSS) meeting in Orlando in December 2012.

Limitations and Conclusions

The most significant limitation related to the regional collaboration activities described above is the ability of representatives from each of the Northeast states to participate in the annual regional surveillance conference. In past years, a number of states have been unable to participate in the conference due to various factors, most notably budgetary restrictions or restrictions on travel that exist within their particular states. In addition, the number of participants joining the conference from each state is often limited by similar restrictions. The group has overcome this limitation partially in the past by providing travel funds to participants as well as by providing conference notes and summary materials to those individuals and states unable to participate. Although the group has attempted to include states with travel restrictions in past years through the use of conference telephone lines, states using those methods generally feel very disconnected from the meeting and find it hard to participate. In future years, we may be able to add a web-based component to the conference to facilitate those individuals from states with travel restrictions.

An additional limitation related to the regional indicator work described in the past had been be the inability to get occupational health indicator data from all of the Northeast states. As mentioned previously, indicator data should be available from regional states that receive surveillance funding from NIOSH; however similar data from states not participating and not otherwise collecting indicator data each year may not be as readily available. In the event that data for a specific indicator is not available from a subset of Northeast states, analyses will include only those states for which the indicator data is available, although other states will be invited to continue to participate in the investigational activities.

Publications

1. Environmental Health Technical Brief; *Hazards to Communities from Chemical Handling and Storage in Workplaces, (2013)*

2. Proportion of Dermatitis Attributed to Work Exposures in the Working Population, United States, 2011 Behavioral Risk Factor Surveillance System, *American Journal of Industrial Medicine 57:653-659 (2014)*

3. "*Elevated Blood Lead Levels Related to the Use of Firearms*, JOEM. (Manuscript #JOEM-15-5424) (In Press)

Data Sets

Agency: State of Connecticut- Department of Public Health		
Name Of Database/Summary Description of Data	**Releasable to Public**	**Format**
Adult Blood Lead Epidemiology and Surveillance (ABLES)—Adult blood lead level test results for Wisconsin residents (reported by laboratories directly to DPH)	Only in Aggregate	Excel or Comma Delimited
Occupational Illness and Injury Surveillance System (OIISS)	Only in Aggregate	SAS, Excel, Comma Delimited
Mercury and Heavy Metals	Only in Aggregate	Excel or Comma Delimited
Emergency Room Visits (work-related)	No	SAS
Inpatient Hospitalizations (work-related)	No	SAS
Poison Control Database (ToxiCall)	No	Excel

Citations

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