FINAL PROGRESS REPORT

MARYLAND OCCUPATIONAL HEALTH AND SAFETY SURVEILLANCE PROJECT

MARYLAND DEPARTMENT OF HEALTH

CDC COOPERATIVE AGREEMENT 6 U60OH011154

PROJECT PERIOD: JULY 1, 2016 – JUNE 30, 2021

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ABSTRACT

The Maryland Department of Health's Occupational Health and Safety Surveillance Project (OHSSP) completed a successful project period, with significant progress made in occupational health surveillance, prevention, and response activities. The project included the following activities:

1. Continue to produce occupational health indicators demonstrating trends in occupational illness and injury in Maryland;
2. Improve surveillance for occupational illness and injury in the state through use of other surveillance systems like the Behavioral Risk Factor Surveillance System, infectious disease surveillance, and electronic laboratory reporting;
3. Increase outreach and prevention activities through partnerships with other public health-focused organizations; and
4. Improve outcomes related to opioid-related morbidity and mortality through research and outreach activities focused on the workplace.

The project identified potential benefits for worker safety and health through improvements of occupational surveillance systems, as well as specific outcomes related to occupational infectious disease surveillance. In the area of opioids morbidity and mortality, the OHSSP identified opportunities to improve management of opioids in the workplace and continues to pursue this objective. The project also played a major role in responding to workplace prevention activities in the Department's overall response to major infectious disease events (Ebola virus disease and COVID-19).

SECTION 1

KEY FINDINGS

Occupational injury and illness rates in Maryland have plateaued or fallen during the project period. Key occupational injury and illness indicators have shown consistent declines in major indicators, including the CSTE indicators submitted by the Maryland Occupational Health and Safety Surveillance Project (OHSSP) to CDC/NIOSH during the period. Since 2010 there has been a plateau in the rate of occupational injuries and illnesses and in the fatality rate. Meanwhile, the rate of hospitalizations has experienced a significant decline, which may be related to several contributing factors: (1) an actual decline in the rate of serious work-related injuries; (2) changes in the reimbursement structure for hospitalizations generally in Maryland, which includes both the implementation of the Affordable Care Act, and the Total Cost of Care model and waiver for Maryland, which is a unique reimbursement and cost containment mechanism to control total health care costs; and (3) other changes in reimbursement or cost containment implemented by workers compensation carriers, which are not visible to the Department of Health.

COVID-19 and other major events demonstrated the importance of integrating occupational data in state surveillance systems. Another key finding from this project period was the importance of integrating industry and occupation (I/O data in state surveillance systems. OHSSP conducted analyses of I/O data in several other Department of Health surveillance systems, including the National Electronic Disease Surveillance System (NEDSS), for gastrointestinal disorders (*Salmonella, Campylobacter)* potentially linked to occupation and industry, and the Maryland Violent Death Reporting System (MVDRS). In each case, there were significant associations between certain industries and occupations and the outcome of interest (infectious gastroenteritis, violent death) with implications for prevention strategies. In addition, in both examples the analysis found shortcomings with the quantity and quality of I/O data that limit the potential utility of the surveillance system, and in its new project OHSSP seeks to address these limitations.

Occupational Health and Safety played a key role in significant infectious disease outbreaks and emergency response. The OHSSP worked closely with infectious disease units of the Maryland Department of Health and other state agencies during Ebola, Zika, and COVID-19 to address occupational aspects of these significant infectious disease outbreaks (and, in the case of COVID-19, a worldwide pandemic). Each of these events demonstrated the value of the OHSSP to formulating communications, outreach, and intervention strategies with affected occupational populations, including outdoor workers (Zika), health care and laboratory workers as well as general occupational populations and environmental services workers (Ebola), and general working populations, particularly workers in congregate and otherwise densely populated work settings (COVID-19).

Opioids in the Workplace were a major focus during the project period. Responding to the increase in opioid-related mortality and morbidity during the project period, the OHSSP convened a workshop on improving the management of opioids in the Maryland workplace in 2018. That work led directly to a collaboration with the University of Maryland School of Medicine that has resulted in an online training curriculum for health care providers on the prescription drug monitoring program and work-related pain management, and the ongoing development of toolkits to improve the management of opioids in the workplace.

TRANSLATION OF FINDINGS

The findings from the project were immediately applicable to some of the most significant activities of the Department and the state during the project period. OHSSP findings and recommendations were

incorporated in infectious disease outbreak responses for Zika, Ebola, and COVID-19, and OHSSP continues to participate in and coordinate many of these activities. The need to incorporate I/O data in infectious disease surveillance was more evident during the COVID-19 response, as the state responded to outbreaks and COVID-19 related work restrictions in a large variety of workplaces, from poultry processing to manufacturing. This has had implications for other conditions such as substance use disorders, as the state has worked to respond to the increasing mortality and morbidity related to opioids. OHSSP has identified a number of potential opportunities to improve I/O data for surveillance involving electronic health records and health information exchanges and is actively pursuing these. The other major activity of the OHSSP involved opioids in the workplace, and these activities have been actively communicated to and promoted by other Departmental units engaged in opioid response. In particular, the activities to develop toolkits and improve management of opioids in the workplace has been co-sponsored by the Department's Overdose Data to Action program, funded by a cooperative agreement with the National Center for Injury Prevention and Control.

RESEARCH OUTCOMES/IMPACT

Intermediate Outcomes: The significant intermediate outcomes of the project were changes in workplace policies and practices to prevent the spread of occupationally acquired infectious diseases (including Ebola and COVID-2) adopted by employers and workers and communicated by state and local agencies. Examples include the coordinated efforts of Delaware, Maryland, and Virginia (DelMarVa), CDC/NIOSH, the U.S. Food and Drug Administration, and the poultry industry, to address the potential transmission of COVID-2 in poultry processing plants located on the DelMarVa peninsula, and the 2017 workshop on highly pathogenic medical waste (Maryland Department of Health, 2019). The recommendations to mitigate occupational spread were developed and implemented during the pandemic and resulted in both improved workplace policies and the identification of Factors that might affect SARS-CoV-2 transmission among foreign-born and U.S.-Born poultry facility workers (Rubenstein et al., 2020).

Potential Outcomes: The first potential outcome relates to the findings and recommendations around industry and occupation (I/O) data in surveillance systems. These include the need for improved I/O data in the infectious disease surveillance system demonstrated during a review of potentially occupationally acquired infectious gastroenteritis (Su CP et al., 2017; Mitchell and Jordan, CSTE presentation, 2019) and the value of I/O data in the Maryland Violent Death Reporting System (Smith et al., 2017) and Behavioral Risk Factor Surveillance System (Dissen et al., 2017). The second potential outcome is the opportunity and need for improved management of opioids in the workplace, which was the focus of a major workshop report with recommendations across several domains (Maryland Department of Health, 2019), and an evaluation of an online training module for health care providers (University of Maryland School of Medicine, 2021).

SECTION 2

SCIENTIFIC REPORT

Background

Much of the work of the Maryland Occupational Health and Safety Surveillance Project (OHSSP) in this project period involved a continuation of surveillance and production of occupational health indicators (OHIs), improvement in efforts to use Maryland's workers' compensation data for injury and illness surveillance, and blood lead surveillance. Maryland also proposed to extend these activities and to expand the efforts to improve occupational safety and health surveillance and prevention by developing projects in priority focus areas as identified by the external advisory group, and based on examination of available surveillance data and state priorities. The priority focus area was prescription opiates.

Specific Aims

5. Advance occupational epidemiology public health research in occupational health through continued production of existing OHIs from existing sources of data.
6. Strengthen the current OHIs through new data sources, including workers' compensation data shared with MOSH, electronic laboratory reporting (ELR) data, data from the Maryland Violent Death Reporting System (MVDRS), and data from the Maryland Behavioral Risk Factor Surveillance System (BRFSS).
7. Enhance outreach and prevention activities in partnership with the Maryland Violence and Injury Prevention Program (VIPP), the Partnership for a Safer Maryland, and the MDE (which houses the State's Lead Poisoning Prevention Program).
8. Share findings from surveillance programs with colleagues in the occupational health and safety field and the general population.
9. Use data from one or more workers' compensation insurers and the Workers' Compensation Commission to estimate the number of workers who are treated with prescription opiates.
10. Conduct a follow-up study of workers treated with or without prescription opiates who return to work, evaluating the impact of prescription opiates treatment on return to work and subsequent injury.
11. Demonstrate that an educational outreach campaign can increase utilization of the State's PDMP by health care providers who treat compensable injuries and illnesses.

Methodology

Specific Aim 1. Advance occupational epidemiology public health research in occupational health through continued production of existing OHIs from existing sources of data.

Maryland OHSSP was successful in reporting a majority of the occupational health indicators (OHIs) recommended by the Council of State and Territorial Epidemiologists (CSTE). These indicators are available online, and updates to the statistics continue. OHSSP was able to evaluate the quality of workers' compensation data and determined that Maryland's workers' compensation data management and organization precluded the use of the data. The Maryland Workers' Compensation Commission lacked both a systematic data collection mechanism and infrastructure to provide meaningful data for analysis. In addition, while the Maryland Heavy Metals Registry, which is housed at the Maryland

Department of the Environment, continued to submit adult blood lead reports to NIOSH, Maryland OHSSP was not able to investigate elevated adult blood leads in all cases. This barrier will be addressed in a subsequent project.

Specific Aim 2. Strengthen the current OHIs through new data sources, including workers' compensation data shared with MOSH, electronic laboratory reporting (ELR) data, data from the Maryland Violent Death Reporting System (MVDRS), and data from the Maryland Behavioral Risk Factor Surveillance System (BRFSS).

Maryland's Workers' Compensation Commission introduced electronic first reports of injury during the project period, and OHSSP investigated the potential utility of this reporting mechanism as a means of beginning to analyze worker's compensation injury and illness data. Unfortunately, the electronic first reports of injury were not widely available to employers, and both the Maryland Workers' Compensation Commission and Maryland Occupational Safety and Health were unable to provide any information management infrastructure that would make the first reports available or useful to OHSSP. OHSSP continues to explore other mechanisms to identify on a more timely basis significant trends in occupational injury and illness.

OHSSP had more success in starting to evaluate and incorporate occupational data in other data systems, including the Maryland Violent Death Reporting System (MVDRS) and the Behavioral Risk Factor Surveillance System (BRFSS). MVDRS occupational data coding was evaluated and used to identify work-related homicide in Maryland, while BRFSS included I/O categorization in two periods (2013-2014, and 2020-2021), to allow OHSSP to compare secular trends in I/O for behavioral risk factors.

OHSSP also began to assess the utility of electronic lab reporting (ELR) data received by Maryland Department of Health for heavy metals (primarily lead) for adult blood lead reporting. These discussions were complicated by the legal framework for heavy metals reporting in Maryland, which gives the primary responsibility for collecting heavy metals laboratory results to the Maryland Department of the Environment, and the fact that MDE has still not been able to install a successor to STELLAR, the blood lead data management system that is no longer supported.

Specific Aim 3. Enhance outreach and prevention activities in partnership with the Maryland Violence and Injury Prevention Program (VIPP), the Partnership for a Safer Maryland, and the MDE (which houses the State's Lead Poisoning Prevention Program).

Outreach efforts during the project period involved some collaborations with established programs within the Maryland Department of Health, notably the CDC-funded Statewide Violence and Injury Prevention Program (SVIPP). OHSSP participated in several SVIPP injury forums and presented data from the OHIs, particularly injury trends. These activities quickly became focused on the emerging problem of opioids, resulting in outreach activities in conjunction with the state's overall opioid mortality and morbidity prevention efforts. These included presentations to the state Opioid Overdose Coordination Center, and a workshop focused on opioids in the workplace in 2018. These activities have continued.

Specific Aim 4. Share findings from surveillance programs with colleagues in the occupational health and safety field and the general population.

OHSSP did provide updates on surveillance through the Department's occupational health website and presentations such as the SVIPP statewide injury forums. OHSSP also issued reports on special topics, including highly pathogenic medical waste and worker safety and opioids in the workplace, and presented at national conferences (see Presentations). These presentations and reports had demonstrative impacts on prevention efforts in Maryland, including particularly on the state's approach to opioids and infectious disease in the workplace.

The principal investigator also shared surveillance findings and other activities in lectures and training in the following venues:

- "Occupational Health and Safety", lecture in SSWSOWK 725—Work, Well-Being and Social Policy. University of Maryland (Baltimore) School of Social Work, 2018, 2019, 2021.
- "Occupational and Environmental Medicine Rounds", Johns Hopkins Occupational/Environmental Medicine Residency Program, 2017.
- Resident Rounds, General Preventive Medicine Residency Program, Johns Hopkins Preventive Medicine Residency Program, annual.

Specific Aim 5. Use data from one or more workers' compensation insurers and the Workers' Compensation Commission to estimate the number of workers who are treated with prescription opiates.

This aim to use workers' compensation data depended on an understanding of the Maryland Workers' Compensation system and Workers' Compensation Commission. This agency operates under a statute that does not require extensive record-keeping or information management, and the Commission does not routinely publish data related to injuries and illnesses. In order to better understand the potential utility of these data, the OHSSP met with the medical director and staff director of the Commission for an extensive discussion of the Commission's operations and mandate. During this discussion, several aspects of the Commission's operation became clear:

- The Commission's mandate is to process claims quickly, and it does not open case files or records on claims that are clearly work-related and not subject to dispute. Therefore, a significant number of claims that are filed do not have any records.
- The information management system used by the Commission was an older, non-relational database that was not designed for queries or analyses of multiple records. The Commission was in the process of updating its management system, but it was not available during the project period.
- First reports of injury were filed and processed manually until the beginning of the project period, and not available electronically to most employers. Although there were reportedly efforts to share the first reports of injury with Maryland Occupational Safety and Health (MOSH), that effort was not in evidence during the project period.

Following the unsuccessful efforts to obtain data from the Workers' Compensation Commission, OHSSP attempted to engage with a large state workers' compensation insurer to conduct preliminary descriptive analyses of opioid-related injuries. OHSSP planned to use these data to identify the percentage of workers who are prescribed opiates by type of injury and by occupation/industry classification. Although initially open to the idea of participating in an opioid prevention project was of great interest to the workers compensation carrier we originally contacted, the insurer ultimately

decided not to participate, partly because the insurer had already provided data for a similar project to another academic researcher. The insurer was unwilling to engage in two similar efforts at the same time, and also insisted on a review of the findings that was not compatible with the OHSSP's academic partner's institutional review process.

Specific Aim 6. Conduct a follow-up study of workers treated with or without prescription opiates who return to work, evaluating the impact of prescription opiates treatment on return to work and subsequent injury.

OHSSP and its academic partner planned to use data from a workers' compensation insurer to assemble a de-identified data set of work-related injury cases who were and were not receiving prescriptions for opiates. This data set was to be used to calculate time to return to work and re-injury rates for employees who are or are not receiving prescriptions for opiates, stratified by type of injury and other demographic characteristics. The analysis data set would have been de-identified but would have included prescription opiate status; type and severity of injury; occupation and industry classification variables; limited demographic information; return to work in days; whether the worker returned to the same job and whether or not there were any work restrictions; re-injury status, and time between return to work and re-injury. Opioid prescriptions would have been grouped by short- versus long-acting properties, and by Drug Enforcement Administration schedule. The analysis would also have defined workers as incident users, based on not having received an opiate prescription in the 3 months prior to the first (index) opiate prescription for the compensable injury, in order to distinguish them from chronic users, workers who had previously had some opiate prescription in the period prior to the compensable injury for which they received an opiate prescription.

As noted in Specific Aim 5, the workers' compensation insurer declined to participate in this activity. The OHSSP academic partner was still engaged in discussions within the institution as to whether it was possible to use an alternative data set source at the close of the project period.

Specific Aim 7. Demonstrate that an educational outreach campaign can increase utilization of the State's PDMP by health care providers who treat compensable injuries and illnesses.

The OHSSP's academic partner developed an online training module to train medical providers on the use of the state's prescription drug monitoring program (PDMP) through a series of fictional case studies and scenarios, inviting learners to select clinical decisions and providing feedback on the choices. The online module was disseminated to a non-random convenience sample of health care providers in Maryland from June 2018 to March 2019. A post-training follow-up survey was sent to a subset of participants who provided their e-mail addresses for this purpose. Using Maryland controlled substance licenses, it was possible to match 137 of the 150 participants with PDMP utilization data and compare the number of times per month that the health care providers accessed the PDMP database from December 1, 2017 through June 30, 2020.

The results of the evaluation demonstrated that the training module had the largest impact on actual PDMP use for infrequent PDMP users and providers who had been in practice a shorter time, compared with providers who self-reported that they never used the PDMP, providers who self-reported that they used the PDMP frequently (prior to taking the module), and providers who self-reported that a significant portion of their practice was related to workers' compensation (manuscript under review).

Results and Discussion

During the project period, the Maryland OHSSP successfully met many of its specific aims, particularly related to surveillance, identification of needs and opportunities in occupational surveillance systems in Maryland, outreach and training related to occupational health preparedness for occupational infectious disease responses, and intervention opportunities related to opioids in the workplace. Some of the challenges identified during the project period were due to institutional factors such as concerns among insurers and other state agencies that the proposed occupational health prevention activities were not part of their mandate or purview. In other cases, there were severe limitations in the information management capacity of the agencies to incorporate industry and occupation (I/O) data within their data collection or analysis framework.

The overall results of the project amply demonstrate the value of occupational illness and injury surveillance and prevention activities, and further identified some of the significant needs to improve surveillance, including incorporation of I/O data in surveillance systems, outreach to agencies and the private sector to improve awareness of occupational illness and injury prevention resources, and the importance of integrating occupational safety and health within the larger public health priorities and activities of the public health agency.

Although not originally part of the specific aims of the project, the OHSSP was heavily involved in response activities related to infectious diseases, notably Ebola virus disease and COVID-19. A discussion of the project is not complete without a consideration of the lessons from COVID-19 for occupational health surveillance and illness and injury prevention. These include:

- Workplace safety rules did not adequately address a respiratory pandemic, and there were many instances where employers and regulatory agencies struggled to formulate effective workplace prevention policies (regardless of the availability of adequate personal protective equipment and testing resources).
- The absence of routine I/O data in many surveillance systems (notably infectious disease) limited the ability to analyze possible associations between widespread outbreaks and specific industries and occupations. While this may not have significantly altered the overall response, it has limited the utility of surveillance to examine possible workplace associations, either in the moment or retrospectively.

Conclusions

The Maryland Occupational Health and Safety Surveillance Project completed a successful project period, with significant progress made in occupational health surveillance, prevention, and response activities. The project identified potential benefits for worker safety and health through improvements of occupational surveillance systems, as well as specific outcomes related to occupational infectious disease surveillance. In the area of opioids morbidity and mortality, the OHSSP identified opportunities to improve management of opioids in the workplace and continues to pursue this objective.

PUBLICATIONS

PEER REVIEWED PUBLICATIONS

Imboden R, Frey JJ, Bazell AT, Mosby A, Ware OD, **Mitchell CS**, Cloeren M. Workplace Support for Employees in Recovery from Opioid Use: Stakeholder Perspectives. New Solut. 2021 Sep 13:10482911211043522. doi: 10.1177/10482911211043522. Online ahead of print. PMID: 34510999

Rubenstein BL, Campbell S, Meyers AR, Crum DA, **Mitchell CS,** Hutson J, Williams DL, Senesie SS, Gilani Z, Reynolds S, Alba B, Tavitian S, Billings K, Saintus L, Martin SB Jr, Mainzer H. Factors That Might Affect SARS-CoV-2 Transmission Among Foreign-Born and U.S.-Born Poultry Facility Workers - Maryland, May 2020. MMWR Morb Mortal Wkly Rep . 2020 Dec 18;69(50):1906-1910. doi: 10.15585/mmwr.mm6950a5.

Su CP, de Perio MA, Fagan K, Smith ML, Salehi E, Levine S, Gruszynski K, Luckhaupt SE. Occupational Distribution of Campylobacteriosis and Salmonellosis Cases - Maryland, Ohio, and Virginia, 2014. MMWR Morb Mortal Wkly Rep. 2017 Aug 18;66(32):850-853. doi: 10.15585/mmwr.mm6632a4. PMID: 28817554; PMCID: PMC5657664.

PRESENTATIONS

Mitchell, CS, Jordan, M. "Electronic Health Records, Environmental and Occupational Health– Are We Making Progress?" 2019 Council of State and Territorial Epidemiologists Annual Conference. June 5, 2019, Raleigh, North Carolina.

Dissen E, Lavetsky G, Mitchell C. "Behavioral Risk Factor Surveillance System (BRFSS) Health Indicators by Industry and Occupation in Maryland. Poster presentation, Council of State and Territorial Epidemiologists Annual Conference. June, 2017, Boise Idaho.

Smith ML, Akinyemi AA, Stanley JL, Mitchell CS. "Identifying Occupations Associated with Work-Related Homicide in Maryland State." Poster presentation, Southeast Occupational Network Conference, April 5, 2017, Nashville, TN.

REPORTS AND PROCEEDINGS

Evaluation of Online Training on Provider Use of the Maryland PDMP: Final Report. Contract Number: M00B9400431. July, 2021. University of Maryland School of Medicine. Accessible at: https://health.maryland.gov/phpa/OEHFP/EH/Shared%20Documents/Opioids%20and%20Work/PDMP%20project%20June%202019%20final%20report_share.pdf.

"Opioids in the Maryland Workplace: Challenges and Solutions. A Report on the November 5, 2018 Workshop." August, 2019. Maryland Department of Health. Accessible at: https://health.maryland.gov/phpa/OEHFP/EH/Shared%20Documents/Opioids%20and%20Work/MarylandOpioidWorkplaceReport_091619.pdf.

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