Final Progress Report

Minnesota Occupational Health and Safety Surveillance Program

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Erik Zabel, PhD, MPH
Principal Investigator
erik.zabel@state.mn.us; (651) 201-3635

Kathleen Norlien, MS
Research Scientist
kathleen.norlien@state.mn.us; (651) 201-4613

Center for Occupational Health and Safety
Injury and Violence Prevention
Minnesota Department of Health
85 East 7th Place, Suite 220
PO Box 64882
St Paul, MN 55164-0882

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List of Terms and Abbreviations

ABLES	Adult Blood Lead Epidemiology and Surveillance
APCD	All-Payer Claims Database
CDC	Centers for Disease Control
CFOI	Census of Fatal Occupational Injuries
CSTE	Council of State and Territorial Epidemiologists
DLI	Minnesota Department of Labor and Industry
ER	Emergency Room
I/O	Industry and Occupation
MDH	Minnesota Department of Health
MDA	Minnesota Department of Agriculture
MN OSHA	Minnesota Occupational Safety and Health Administration
NVDRS	National Violent Death Reporting System
NIOSH	National Institute for Occupational Safety and Health
OHIs	Occupational Health Indicators
ROPS	Roll Over Protective Structure
SOII	Survey of Occupational Injuries and Illnesses
WRA	Work-Related Asthma

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Principal Investigator: Erik Zabel, PhD, MPH
Minnesota Department of Health
PO Box 64882
St Paul, MN 55164-0882.
Email: erik.zabel@state.mn.us Phone: (651)201-3635

Abstract

The primary purpose of the Minnesota Occupational Health and Safety Surveillance Program is to enhance the capacity of the Minnesota Department of Health (MDH) to promote occupational health and safety through surveillance and dissemination of 24 Occupational Health Indicators (OHIs). These OHIs were developed and evaluated by the Council of State and Territorial Epidemiologists (CSTE) in collaboration with the National Institute for Occupational Safety and Health (NIOSH). Beyond the core surveillance activities, additional program objectives included developing indicators for farm injuries and farm mental health, developing a work-related pesticide poisoning indicator, working with cosmetologists to assess and educate about worksite health risks, working with Behavioral Risk Factor Surveillance System (BRFSS) data to measure health behaviors and beliefs, and responding to the new workplace risks posed by COVID-19.

The major specific aims of this program were: (1) Maintain a scientific advisory group to identify relevant Minnesota-specific issues and priorities for occupational surveillance; (2) Develop and maintain relationships with agencies, organizations, groups, and individuals who can provide and/or utilize appropriate surveillance data; (3) Collect, analyze, disseminate and utilize Minnesota data for at least 21 specified occupational health indicators using existing data systems based on criteria established by the Council of State and Territorial Epidemiologists; (4) Collect, analyze, evaluate, and disseminate two OHIs related to serious agricultural injuries in Minnesota using existing data systems; (5) Develop and implement additional strategies to disseminate and publish surveillance results, their interpretations, implications, and conclusions; this included an annual performance review of the accomplishments and impacts of Minnesota's occupational surveillance program and associated activities; (6) Collaborate with the CDC-funded MDH Asthma Program to implement components of its 2014 strategic plan for work-related asthma in Minnesota; (7) Analyze Minnesota BRFSS data from 2013 and 2014 to identify relationships between employment in specific industries and occupations and various health behaviors and conditions. Utilize the Total Worker Health paradigm to address health behaviors and chronic disease prevention in the workplace setting through collaborations with MDH workplace wellness programs; (8) Collaborate with occupational health surveillance programs in Iowa and Wisconsin to identify issues, priorities, and potential prevention activities common to the Upper Midwest.

Outputs of the program include annual reports, peer-review publications, conference presentations, fact sheets, educational materials, and data posted to online dashboards. Products were made available on the updated program web site. One other output of this program was public health investigator career development resulting from graduate student internship experiences. The intermediate outcomes we expect to achieve through this project include policy changes at the state and local level. In the long-term, through these policy changes and interventions we plan to achieve our ultimate goal of a measurable reduction in workplace illnesses, injuries, fatalities, and/or hazardous exposures.

Significant (Key) Findings

- Occupational health surveillance has been firmly established at MDH with the annual completion of the OHIs; 24 OHIs have been compiled with accompanying narrative and trend analysis and are now readily available on the MDH Center for Occupational Health and Safety website.
- Agriculture ranks as one of Minnesota's most hazardous industries. While agricultural fatalities are well-documented, non-fatal injuries are largely excluded from existing surveillance systems. Consequently, a methodology was developed to utilize hospitalization and ER data to identify agricultural injuries in Minnesota. This approach identified an annual average of 2,000 injuries related to agriculture that required medical attention. Costs of these injuries were also estimated.
- Relationships and collaborations were developed with a variety of state and academic partners. External partners included the Minnesota Department of Labor and Industry, Minnesota OSHA, Minnesota OSHA Consultation, Minnesota Board of Cosmetology, the University of Minnesota School of Public Health (NIOSH-funded ERC and Ag Centers), Minnesota Technical Assistance Program (MnTAP), and the Health Partners Institute (research foundation). Intra-agency partners included the Asthma Program, Heart Disease and Stroke Program, Infectious Disease Epidemiology, Prevention and Control Division, the Health Statistics Unit, and the Environmental Health adult blood lead surveillance program.
- Cosmetologists are an underserved working population. We collaborated with the Asthma program, Minnesota OSHA Consultation, Minnesota Board of Cosmetology, and the U of M to develop a survey of salon workers' needs, and developed a training curriculum around workplace safety for this population.
- Behavioral Risk Factor Surveillance System (BRFSS) data are a useful resource for measuring health behaviors and beliefs. The addition of coded industry and occupation data has made this dataset even more valuable for measuring the health risks for various working populations.
- COVID-19 became a critical new workplace health issue. MDH and the occupational health program helped respond to this pandemic and develop methodology for tracking the impact of COVID-19 on working populations. Early on in the pandemic we collaborated with occupational medicine physicians to produce simple directions to help keep janitorial workers and their supervisors safe as we navigated early pandemic guidance for essential workers. We also assisted in writing early documents for ventilation in schools and industrial buildings which now have been replaced with CDC guidance.
- The three-state collaboration between Minnesota, Wisconsin, and Iowa produced a helpful way to work on common issues such as workplace fatalities and farm injuries.
- The work-related pesticide poisoning indicator found that numbers of poisonings has declined over time, helping show the effectiveness of workplace safety programs.

Translation of Findings

- CSTE/NIOSH indicator results were published to the MDH web site. The indicator trends can be used to target new in-depth surveillance activities and target intervention efforts at specific industries.
- The OHI methodology was utilized to develop indicators of the rates, trends, and costs of agriculturally related injury in Minnesota. The new indicators of agriculturally related injury provide a much-needed surveillance tool based on existing data sources for more completely documenting serious, but non-fatal injuries in this industry. The indicator data were used to help develop the legislative program to provide funding for tractor rollover protective structures (ROPS).
- The work-related pesticide poisoning indicator analysis found that poisonings are decreasing, indicating the success of work safety programs.
- The program collaborated with the DLI and MN Safety Council to present a dashboard of safety data each Labor Day. This dashboard helps publicize the efforts happening around the state toward preventing occupational injuries.
- Results from the survey of salon workers help indicate areas of focus for education curricula and industrial hygiene improvements in salons to protect this vulnerable population of workers.

Outcomes/Impact

- The program has facilitated the creation of working groups and collaborations working on several specific areas of concern including agriculture, cosmetologists/salon workers, and Total Worker Health. These groups have developed further areas of surveillance, research and public health interventions. The farm safety group helped provide data for a legislative program to prevent tractor rollovers.
- Internal and external Program collaborations have increased awareness of workplace health and safety surveillance issues and priorities among state agencies and academia, identified research and training opportunities, and contributed to the professional development of current and future health and safety professionals in Minnesota.
- The survey of cosmetologists completed with the MDH Asthma Program identified a need for improved health and safety training among individuals in this industry. This led to the development of a training curriculum for this population.
- Farm injury data were used to develop the tractor ROPS program to help farmers install better safety equipment on their older tractors.
- The program has helped train a new generation of public health workers by providing internships for U of M students working on their master's or PhDs.

Scientific Report

Each of the Aims of the **Minnesota Occupational Health and Safety Program,** through the Center for Occupational Health and Safety (the "Center"), are listed below along with a summary of the success in completing those Aims.

Aim 1: *Maintain a scientific advisory group to identify relevant Minnesota-specific issues and priorities for occupational surveillance*

An advisory work group was convened and comprised of individuals from government, academia, and industry. Between 8 and 12 people were members at any time. The work group included individuals with expertise in occupational medicine, workers compensation rules and regulations, OSHA standards and regulations, injury data and statistics, worksite occupational safety and health, and marketing and dissemination of public health and safety related works. provide guidance and advice collectively and individually on grant-related topics and initiatives such as indicator data dissemination and potential collaborations.

During the first four years of the project period the full work group met at least once per year, with second full group meetings, subgroup meetings, and individual communications at more frequent intervals depending on the project of interest. In-person meetings were not held during the COVID-19 pandemic. Pandemic communication occurred through email and small-group virtual meetings.

Individual members of the Center's advisory panel were contacted for guidance on projects and potential collaborations. Subgroup meetings were held with members of the advisory group to address specific issues of concern and garner advice on grant related activities and collaborations. Several meetings were held to discuss projects related to the analysis of the BRFSS Industry and Occupation data. Over the course of the project period new members were added. A new member was identified to represent occupational health nursing and the occupational medicine residency program in Minnesota. A second member from the MN Safety Council was also added to the advisory group.

Aim 2: *Develop and maintain relationships with agencies, organizations, groups, and individuals who can provide and/or utilize appropriate surveillance data*

During the grant period we worked to continue and strengthen our collaborative relationships with the Department of Labor and Industry (DLI), Minnesota OSHA, Minnesota Department of Agriculture (MDA), the University of Minnesota (U of MN) Midwest Center for Occupational Health and Safety (MCOHS), the U of MN Upper Midwest Agricultural Safety and Health Center (UMASH), and other MDH programs. This was facilitated through several activities described below.

- Indicator Data Collection:

Yearly Occupational Health Indicator (OHI) data collection has provided the Center with an opportunity to collaborate with important organizations and programs providing occupational health and safety data. The DLI has provided us with data and expertise for the creation and interpretation of the occupational health indicators that rely on the use of workers' compensation and BLS data. Other MDH programs, such as Asthma, Lead and Healthy Homes, and the Cancer Surveillance System have provided data for OHIs.

- Occupational Health and Safety Dashboard

Another collaboration with the MN DLI includes the Minnesota Safety Council. This three-organization collaboration created a dashboard of occupational health and safety statistics and measures for Minnesota, which can be found here: http://www.minnesotasafetycouncil.org/WorkplaceSafetyDashboard.pdf. Infographics and headlines were created for each of the topic areas to allow for easy dissemination and use. As part of the collaboration, measures from our OHIs were used to complement the data from MN DLI and the MN Safety Council. Physical copies of the dashboard were supplied at a number of meetings with health and safety professionals in an effort to promote awareness of the available data and information. The data and content on the dashboard have been updated annually and can be rotated to address timely issues and concerns. We expect this activity to result in increased awareness of occupational safety and health issues, an awareness of how much time is spent in the workplace, and the impact workplace hazards have on non-work life.

- University of Minnesota student mentoring

A continuing relationship and collaboration were maintained with the University of Minnesota School of Public Health and its two NIOSH-funded Centers, the Midwest Center for Occupational Health and Safety and the Upper Midwest Center for Agricultural Safety and Health. This relationship has provided an opportunity to collaborate on methods to disseminate data and information, provided training opportunities for students, and offered a chance to share expertise. These collaborations have led to the placement of three graduate student interns to address specific issues of occupational safety and health. Two of the interns completed projects at the MDH and a third worked on a project facilitated by DLI. One example of this collaboration is the Cosmetologist project described below.

- Cosmetologist Project

As part of the cosmetologist project described below under Aim 6 the Center collaborated with the U of M Midwest Center for Occupational Health and Safety. The Center helped advise a PhD student in completing her doctoral research by implementing a survey of cosmetologists about workplace safety, and by analyzing BRFSS data for cosmetologist's beliefs and attitudes about workplace safety. The programs collaborated to produce educational materials for cosmetologists. A half-day training session was developed by members of the collaboration to address some of the occupational safety and health concerns for this population.

- MN Asthma Program

The relationship with the CDC-funded MDH Asthma Program was strengthened as described below under Aim 6.

- MDH Lead and Healthy Homes Program

The Center collaborates directly with the MDH Lead and Healthy Homes Program through the Adult Blood Lead Epidemiology and Surveillance (ABLES) program. The Center provided funding for Minnesota ABLES through this grant and uses the resulting data in the annual indicators. During the grant period we also collaborated with the Lead Program on issues related to adult and childhood exposure from the Water Gremlin manufacturing plant (battery terminals and fishing tackle). The local community was experiencing significant take-home lead exposure in plant workers' children.

- Farm Safety Working Group

The Center continues its relationship with the MDA and now participates as a member of the Farm Worker Safety workgroup co-chaired by the MDA and the Minnesota Safety Council. Two major projects have come from this collaboration, tracking of serious farm injuries and the Rollover Protective Structures (ROPS) programs.

Farm injuries. The Working Group collaborators explored the possibility of linking multiple datasets to create a more complete and accurate measure of the number of injuries with a relationship to agriculture that occur annually in Minnesota. The collaboration also aims to address the long-term health care costs associated with injury related to agriculture. The agricultural sector in Minnesota has been identified as one with high rates of injury and fatality. The data generated by the current surveillance methods has been used to identify and draw attention to the issue, leading to the allocation of resources for intervention programs. A more refined methodology that allows for a more complete and accurate case capture will allow for evaluation of these programs and greater specificity in intervention programs and aims. The long-term goal of these efforts is to reduce injury from agricultural work-related activities. See Aim 4 below for further information on farm injury surveillance.

Roll Over Protection Structure program. The Working Group collaboration has identified a Roll Over Protection Structure rebate program for farm tractors as a good starting place to intervene and prevent fatalities related to tractor roll overs. A collaboration between the MN DLI, the MN Department of Agriculture (MDA), and the MDH Center for Occupational Health and Safety (Center) joined the New York Center for Agricultural Medicine and Health (NYCAMH) Roll Over Protection Structure (ROPS) program to provide rebates to MN farmers for ROPS installation. This work began with the sharing of the newly calculated CFOI numbers by the MN DLI and the concerning finding that agriculture still accounts for over 1/3 of work-related fatalities in MN. The Center had an integral role in moving this work forward, by researching possible interventions, aiding in identifying existing programs, making connections with NYCAMH and other interested parties, and organizing a meeting of the three agencies, NYCAMH, the Wisconsin ROPS program, and interested stakeholders to learn about the program and how to participate. Two bills were introduced and survived the 2016 legislative session, one for the ROPS program and one for farm safety in general. The program was initially

funded with $250,000 in state money and $20,000 in private donations in the year 2016. Those resources were completely allocated within three months of the program launch and a waiting list was developed. The 2017 legislature continued the funding ($150,000) and support for the program. The ROPS Rebate program will continue to provide subsidies to farmers to install ROPS on tractors and reduce the risk of fatal rollovers.

- FarmFest

The PI collaborated with the U of M's Upper Midwest Agricultural Safety and Health Center (UMASH) to attend the MDH booth at Minnesota FarmFest in August 2019. FarmFest is a large annual gathering of farm community members in western Minnesota. Information was provided on farm injuries and their prevention, and on farm mental health issues. We also developed and provided a paper/handout about asthma and farm work. Participation was virtual in 2020 due to COVID-19 precautions.

- Heart Safe

The Heart Safe Communities Program, in collaboration with the MDH Heart Disease and Stroke Unit, has created an application process that provides workplaces with the opportunity to become a "heart safe workplace" and promote activities that would increase the likelihood of survival should an employee have a heart attack or stroke on site. Most recently MN DLI has been identified as another collaborator to promote the program to health and safety, as well as human resources, personnel through a quarterly newsletter. Heart Safe has recently enrolled three large Minnesota corporations into the program. The collaboration strengthens ties between chronic disease programs and the Center. It also promotes health and safety activities that will aid in maintaining safe work environments.

Aim 3: *Collect, analyze, disseminate and utilize Minnesota data for 21 specified occupational health indicators using existing data systems based on criteria established by the Council of State and Territorial Epidemiologists (CSTE, 2014)*

The MDH Occupational Health and Safety Surveillance Program exceeded expectations with the completion of the original 21 indicators, plus three additional indicators that were added by CSTE. When possible, each indicator was completed for an expanded time period, providing a better opportunity to examine statewide trends. The compiled indicator data was shared annually with NIOSH and CSTE as per the cooperative agreement. A Program website was developed, with a separate page of text and graphics for each OHI.

- As of June 2021, Minnesota Occupational Health Indicators (OHIs) for the years 2000-2017 had been completed and submitted to NIOSH for presentation on the CSTE website. Of special note is that data to calculate Indicator #21 ("Asthma among adults caused or made worse by work") became available in Year 4 for the first time and Minnesota rates were provided.

- The PI participated on the CSTE Occupational Health Indicator Workgroup.
- A public health graduate student intern assisted in creating a document that housed all the available information for the Minnesota OHIs. This document was published to the program website: www.health.state.mn.us/communities/occhealth/documents/IndicatorReport2013.14.pdf. An updated report is planned for Winter 2022 after the web site is revised. Staff changes and COVID-19 reassignments prevented developing a more recent updated report.
- Two related state-specific indicators have been developed and evaluated as described below under Aim 4. The first makes use of state hospital discharge data to identify cases of injury related to agricultural work. The second builds off of these injury counts to create estimates of the cost, both direct and indirect, associated with injury related to agriculture. Documentation to continue to calculate these indicators was developed to share with other states that have an interest in tracking these injuries. The process of revising these indicators for ICD 10CM codes was begun in the last two years of the project period.
- A data file of yearly indicator data for 2000-2020 has been prepared in order to display data on the in-development occupational health module in the Minnesota Injury Data Access System (MIDAS). MIDAS is a Tableau-based system to provide customizable public data access to Minnesota injury and drug and alcohol data (see Aim 5 below for more information about MIDAS). The occupational health module is expected in late Fall 2021.

Aim 4: *Collect, analyze, evaluate, and disseminate two OHIs related to serious agricultural injuries in Minnesota using existing data systems*

To track fatal farm injuries, an online Google-News Search was used to identify agricultural fatalities and media or news clippings relating to each incident were collected. We have also subscribed to the Marshfield Ag Injury News website to review available clippings of news items describing agricultural injury events. This methodology represents an extremely cost-effective method for surveillance of agricultural-related fatalities in both workers and children.

Existing OHIs (CFOI) have consistently identified agriculture as one of Minnesota's most hazardous industries. While agricultural fatalities are well-documented, serious non-fatal injuries are largely excluded from existing surveillance systems, including SOII and workers' compensation. Consequently, a methodology was developed to conduct surveillance for injury related to agriculture in Minnesota utilizing hospital and ER discharge data. Two related state-specific indicators have been developed and evaluated. The first makes use of state hospital discharge data to identify cases of injury related to agricultural work. The second builds off of these injury counts to create estimates of the cost, both direct and indirect, associated with injury related to agriculture. This methodology identified an annual average of 2,000 injuries related to agriculture requiring some form of medical attention. This work comprised a University of Minnesota doctoral dissertation by the Program Director and later Principal Investigator.

- The indicator describing the counts, rates, and trend of serious agricultural injury in Minnesota was updated through the year 2015 (the last year of ICD 9CM codes).
- The crosswalk for the indicator from ICD-9CM to ICD-10CM was drafted.
- The two indicators developed to describe serious agricultural injuries in Minnesota have both been written up and accepted for publication in the Journal of AgriMedicine.
- We established a relationship with the Essentia Rural Health Institute attempted to secure additional funding to evaluate and validate the methodology used to identify these injuries. A time-intensive record review is necessary to fully evaluate the farm injury indicators. A grant application was submitted but was not funded.
- A webpage for this indicator was created and added to the Center indicators page.
- A "How To Guide" for the calculation of the indicator guidance was written and shared with our Tri-State collaboration partners for testing and review. The drafted "How To Guide" for the calculation of the indicator has been shared with two other states, Wyoming and Montana. Wisconsin, a member of our Tri-state collaborators used the guide to calculate rates for the state.

Aim 5: *Develop and implement additional strategies to disseminate and publish surveillance results, their interpretations, implications, and conclusions; this will include an annual performance review of the accomplishments and impacts of Minnesota's occupational surveillance program and associated activities*

A high Program priority was the development of a web presence. To that end, a website was developed describing the Center, each of the Center content areas, and separate pages for each of the OHIs with text, tables, and graphics (www.health.state.mn.us/communities/occhealth/index.html). In addition to web-based dissemination of information and data, numerous oral or poster presentations have been given over the six year period to disseminate findings to professional audiences (see Publication/Presentation list below).

- Indicator dissemination

As each additional year of occupational health indicator data was added, a revised trend analysis was completed, and the indicator website updated annually with the current information. The updated MN Farm Injury indicator was shared with the MN Dept. of Agriculture Farm Safety Workgroup and updated on the Center website.

- Work Safe Work Smart

The 2012 update to the *Work Safe Work Smart* curriculum was re-posted to the website and made freely available to users at no cost.

- Feasibility Report

The report, *Feasibility of an Occupational Disease Reporting System*, describing the considerations in implementing active occupational health surveillance based on state statute, was also posted on the Program website.

- Data dashboards

The Center contributed to the MDH Health Promotion and Chronic Disease Division's data dashboard by highlighting the Center's mission to provide data and information about occupational safety and health injuries and illnesses. The Dashboard included the OHI for work-related fatalities with links to our program website and the other OHIs. In Year 4 of the project period the Center was moved from the Chronic Disease and Environmental Epidemiology Section to the Injury and Violence Prevention Section. As part of that move, an occupational health module is planned for the update and expansion of the Minnesota Injury Data Access System (MIDAS), a web-based application that is used by state and local agencies, trauma centers, and community-based organizations to understand the impact of injury, violence, and other conditions associated with occupational health in Minnesota. MIDAS is a Tableau-based system to provide customizable public data access to Minnesota injury, drug, and alcohol data. A data file of yearly indicator data (2000-2020) has been prepared in order to display data on the in-development occupational health module. The CSTE/NIOSH OHIs will be included in this module when it is completed. The draft farm injury indicator is currently included in the MIDAS general injury module as a selectable data filter.

- Agricultural safety report and data

During the project period the MDA was directed to produce a report outlining the available health and safety programs and materials, as well as data describing counts, rates, and trends of fatalities and injuries related to agriculture. The farm injury indicator created by the Center was used in the report and provided to legislators to provide context for the need to increase support for agriculture health and safety activities.

- Work-related pesticide poisonings

An expanded analysis of the work-related pesticide poisonings indicator was published in the Journal of Environmental Health (https://www.neha.org/node/61079). See the Publication/Presentation list.

- Occupational Health and Safety Dashboard

The Dashboard collaboration between the Center, MN DLI, and the MN Safety Council was updated and promoted annually for Labor Day.

Aim 6: *Collaborate with the CDC-funded MDH Asthma Program to implement components of its 2014 strategic plan for work-related asthma in Minnesota*

The occupational health surveillance program continued its support and collaboration with the MDH Asthma Program. Program staff participated on the MDH Asthma program's reconvened work-related asthma advisory panel. Program staff focused on cosmetologists in several ways, including collaborating with the Asthma Program, Board of Cosmetology, and U of M on the creation, analysis, and interpretation of an online survey of 1,900 licensed cosmetologists, identified through the licensure lists maintained by the Bureau of Cosmetology. The survey inquired about health and safety training, work practices, and respiratory health outcomes. Education training.

- Work-Related Asthma Advisory Group.

The CDC-funded MDH Asthma Program re-convened an advisory workgroup to address the issues of work-related asthma in Minnesota. As collaborators, the Center continued to participate in the planning and conduct of advisory panel meetings.

- Cosmetology working group

In cooperation with our Asthma Program we joined a working group comprised of researchers from the U of MN, MN OSHA, MN Pollution Control Agency, MDH, Hennepin County Public Health and the MN Board of Cosmetology to address and promote awareness of the hazards associated with nail salons. Prior to COVID-19 the group met monthly to discuss the creation and execution of several studies to identify exposures of concern, capture levels of exposure, measure health and safety behaviors and levels of training related to exposure prevention and reduction. The group led to several projects to assess and improve the respiratory health of the population.

Survey. The working group assisted in the development of a survey instrument to be used in nail salons throughout Hennepin County with the intent of collecting information about exposures, health and safety training, and willingness to adopt greener products in their business. The study aims to gather this information prior to a change the rules that would require the inclusion of occupational health and safety training in the continuing education credits this employee population is required to complete every three years. The study would also create a roster of salons that would be willing to have environmental monitoring completed. External funding was obtained to conduct a series of focus groups to ascertain the most appropriate method of survey delivery, language preferences, and health and safety issues of concern. External funding was obtained to conduct the survey. A graduate student developed the study materials and has begun administering the survey. Importantly, the survey has also been translated into Thai and Vietnamese to reach these populations. The information gathered from this survey will help evaluate a newly implemented occupational health and safety licensure rule. The data will also inform the updating of rules regarding education standards for cosmetology schools.

Training session and materials. A half-day training session was developed by members of the collaboration to address some of the occupational safety and health concerns for this population. The Center contributed and presented content for the training segment identifying occupational safety and health resources that salon owners and educators could use in their

practice. Other topics for the training included: Ergonomics, Chemical Safety, and PPE. An evaluation of the session was completed, and the group hopes to further refine the training and hold more training sessions in the future.

- Staffing

To further enhance our collaboration with the Asthma program, a research scientist from the asthma program has joined the occupational health and safety program 70% time (not funded by this NIOSH grant during this reporting period). This will enhance the program's expertise and capacity in work-related asthma and respiratory occupational health diseases and conditions.

Aim 7: *Analyze Minnesota BRFSS data from 2013 and 2014 to identify relationships between employment in specific industries and occupations and various health behaviors and conditions. Utilize the Total Worker Health paradigm to address health behaviors and chronic disease prevention in the workplace setting through collaborations with MDH workplace wellness programs*

MDH began using the industry and occupation (I/O) module in 2013 data collection. Needed to get buy-in from the BRFSS coordinator, and COHS staff required training on use of the data. The BRFSS coordinator is currently evaluating the response rates and data quality to address his concerns about maintaining privacy and how the data can be used appropriately and responsibly. Once the coordinator has evaluated the data completely and determined the limitations in its use we will be provided access to the data to complete our analysis. Key activities.

- BRFSS Training

In Year 1 the statistician attended both CSTE-sponsored BRFSS training sessions for the use of the industry and occupation variables in the dataset. The program director attended the second session and participated on the NIOSH hosted conference calls for states that are making use of the data.

- Obtain data

The Center obtained the BRFSS data for the years 2013- 2016 which include the optional module for industry and occupation (I/O). The data has been cleaned and the files created for the identified analyses. The data have been evaluated for consistency and reliability and basic analyses for several health conditions and behaviors by occupational and industrial groupings have been completed. These analyses will be used as the foundation for a more in-depth comprehensive analysis combining multiple years of data. In year 6 the COHS received more recent data, 2017-2018 and will perform further analysis in the next grant period.

- Analysis projects

Two projects have been identified that will make use of this unique data. The first project is investigating health behaviors and outcomes for cosmetologists and a comparison population. The second is investigating mental health behaviors by occupation and industry to address concerns regarding a potential increase in poor mental health outcomes and suicide among farmers. These analyses will be useful in identifying issues and populations of interest for programmatic intervention. The data provide an opportunity for the Center to collaborate with other programs, agencies, and non-profits to address specific health behaviors and health conditions in identified working populations. These analyses will support and provide data for further research and future projects.

Aim 8: *Collaborate with occupational health surveillance programs in Iowa and Wisconsin to identify issues, priorities, and potential prevention activities common to the Upper Midwest*

We formed a Tri-State collaboration with the Wisconsin and Iowa Occupational Health and Safety State Based Surveillance programs. The collaboration aims to address issues of occupational health and safety at regional level. A stronger relationship between the three states allows for increased communication and leveraging of resources. The three states share borders and often have citizens living in one and working in another. These relationships allow for coordinated responses, decreasing possible confusion or miscommunication. The agricultural sector and occupational fatalities were identified as the two issues of concern that the three states have in common and can work collaboratively around to identify a potential intervention and develop a proposal. All three states have strong agricultural sectors and reductions of injuries and fatalities in this employment sector is important.

- Meetings

Prior to the COVID-19 pandemic the group annually had two in-person meetings, at the CSTE annual conference and the grantee winter meetings, and multiple phone meetings. The group met virtually in the last year and a half of the grant period.

- Regional Report

The three states are currently investigating the feasibility of developing a regional report of the occupational health and safety indicators, and are working to update the previously developed farm injury indicator for use with ICD 10 CM codes. A regional report of the descriptive epidemiology of occupational safety and health indicators can assist in identifying programmatic activities for the region. The report may also assist in expanding this partnership to other entities with interests in addressing occupational safety and health, such as the Midwest NIOSH ERC's and Ag Centers. Also, as the three states have similar types of industries, they can leverage the experiences and programs that each state develops and tests.

- Farm Injuries

The agricultural sector and occupational fatalities have been identified as the two issues of concern that the three states have in common and can work collaboratively around to identify a potential intervention and develop a proposal. Iowa and Wisconsin tested the ICD 9CM-based "How To Guide" for calculating the count, rate, and trend of injuries related to agriculture. The three programs decided to use the occupational fatalities indicator as a method to identify potential similarities and differences among the three states. Iowa and Wisconsin are also pilot testing the updated ICD 10CM methodology.

Additional Program Activities That Were Undertaken Beyond the Original Aims: *Additional activities were undertaken during the course of this Program as resources and time permitted. These are described below:*

- COVID-19 Pandemic Response

The COVID-19 pandemic has delayed some activities this year, but provided a chance for new collaborations and a new occupational health challenge for long-term follow-up. The PI was reassigned to work 32 hours per week on case and contact investigation from March 30 through June 15. He also was reassigned half time beginning in September 2020 to Workplace COVID-19 Cluster investigations. This limited the effort that could be spent on occupational health surveillance activities.

The Center collaborated with outside experts to provide COVID-19 educational materials for janitors and their employers, and general information for all workers. These have been posted to the MDH occupational health website, https://www.health.state.mn.us/communities/occhealth/reports/covidresources.html. Other information on COVID-19 for employees and employers was developed by the Minnesota Departments of Labor and Industry and Employment and Economic Development.

- LTS – Long COVID follow-up

The Center is an active member of the MDH Tracking Program's Long Term Chronic Disease and Injury Surveillance Annex. The Annex is part of the MDH emergency preparedness plan. The Annex has been developed to aid in conducting follow up and special studies of populations (eg. First responders) that have been impacted by a disaster – manmade or natural. The Annex was activated in 2021 to provide expertise and coordination in follow-up for "Long COVID".

- Grantee Winter meeting

In Year 3 the Center co-hosted the annual meeting for the NIOSH state grantee surveillance program meeting and the CSTE Winter meeting.

- All-Payer Claims Analysis

The Center has obtained access to the MN All Payers Claims Database (APCD). The APCD collects information, including cost and payment information, related to health care services provided to all Minnesota residents. The project intends to use the MN APCD to create an estimate of the health care costs associated with agricultural-related injury. A more accurate measure of the health care costs associated with injury with a potential relationship to agriculture, including downstream or rehabilitative care costs, pharmaceutical care costs, and readmission costs. This will also provide the Center with the opportunity to familiarize itself with the MN APCD and identify other occupational health and safety investigation opportunities this data source might provide. This project was delayed by the COVID-19 pandemic and loss of Center staff time.

- Pesticide Poisoning Data

A public health graduate student intern worked with the Center to investigate and evaluate the guidance for sub-state analysis and mapping by using the available MN Poison Control Center work-related pesticide poisoning data. An analysis of the differences between occupational and non-occupational poisoning events was completed and a presentation of the results was made to the MN Poison Control Center. This research served as the intern's master's thesis and was published in the Journal of Environmental Health (see Publication/Presentation list below).

- Workers' Compensation Analysis

A public health graduate student intern conducted a descriptive epidemiological project using the 15 years of workers' compensation data available to the center. The analyses aids in identifying future research activities as well as provides further detail regarding the most common work-related injuries in Minnesota. A summary of key findings for the data years 2000-2015 was prepared and posted to the Center web site.

- Legislative Firefighter Proposal

Center staff responded to a MN legislative proposal that would establish a voluntary cancer registry for Minnesota firefighters. A fiscal note was prepared to address the requirements of such a system. Subsequent meetings between Center staff, the key legislator, and a firefighter union leader addressed limitations of a voluntary registry, published research on cancer risks among firefighters, and potential preventative actions that would reduce harmful exposures and cancer risks among firefighters. The voluntary registry bill was withdrawn in favor of future more productive proposals to support education and preventative actions to reduce exposures to harmful substances and promote health of firefighters.

- Total Worker Health

The Center collaborated to establish a new working group to discuss and investigate opportunities to promote Total Worker Health. The working group is comprised of individuals from the MDH's Office for Statewide Health Improvement Initiative, the U of MN Midwest Center for Occupational Health and Safety, MN Safety Council, Health Care Providers, Health Insurers, the Veterans Administration, and Workers' Compensation Insurers. The group has

applied to be a NIOSH Total Worker Health Affiliate. This group provides an opportunity for the Center to provide data to other workgroup members. In turn these data may support the development or implementation of total worker health practices that these partners would have the audience and resources to reach. The work group provided an opportunity for the Center to disseminate the work it has completed using the BRFSS data in describing the patterns of health behaviors and conditions by different occupational and industrial groups.

- Opioid use and overdose

The Center is collaborating with the MDH Injury program to address opioid use and overdose. With input from the Center the Injury program will now be collecting industry and occupation in the Minnesota supplemental redcap form that abstractors use when populating National Violent Death Reporting System (NVDRS).

- MN Student Survey

The Center submitted a request to include a question on the Minnesota Student Survey to collect information about industry and occupation from students that respond in the affirmative when asked if they have a job.

- RETAIN technical assistance

The MDH COHS provides formal technical assistance to the Mayo Clinic Occupational Medicine Department as the Retraining Employment and Talent After Injury/Illness Network (RETAIN) awardee in Minnesota. This grant program funds states to do research on improving return to work strategies. Mayo Clinic was funded to participate in Phase 1 of RETAIN, and will be applying to participate in Phase 2.

Reports, Publications, and Presentations

2020-2021

- Zabel E, PhD MPH. [2021]. Farm Suicide. Farm Suicide: Developing a More Inclusive Methodology. Rapid Fire Presentation, Council of State and Territorial Epidemiologists Annual Meeting. June 15, 2021. Virtual.
- Zabel E, Norlien K. MN Safety Conference. [2021]. Tracking Occupational Health and Safety Trends in Minnesota. May 8, 2021. Virtual.
  September 28, 2021
- Work during COVID-19. [2020]. Fact Sheet for COVID-19 workplace safety. Posted to MDH web site, then removed when CDC guidance was available. June 2020.
- Work during COVID-19: Employers of Janitorial Workers. [2020]. Fact Sheet for COVID-19 workplace safety. Posted to MDH web site, then removed when CDC guidance was available. June 2020.
- Work during COVID-19: Janitors and Custodians. [2020]. Fact Sheet for COVID-19 workplace safety. Posted to MDH web site, then removed when CDC guidance was available. June 2020.
- COVID-19: Ventilation Guidance for Schools. [2020]. Fact Sheet for COVID-19 workplace safety. Posted to MDH web site, then removed when CDC guidance was available. June 2020.

2019-2020

- Zabel E. Guy L. Coutinho, S. Heinen M. Farm Suicide: Developing a More Inclusive Methodology. [2020]. American Association of Suicidology Annual Conference. April 21, 2020. Virtual.
- Zabel E. Guy L: Developing a More Inclusive Methodology. Minnesota Suicide Prevention Task Force. [2020]. February 11, 2020.
- I can Breathe Clearly Now—overcoming barriers to a healthy workplace, a survey of Minnesota's salon workers. [2020]. American Public Health Association Round Table presentation. 1-2 p.m. October 27, 2020.
- Norlien K. [2019]. Poster presentation at the Community Health Conference, Brainerd, MN. October 3-4, 2019.
- Capper G, Landsteiner A. Pesticide Poisonings in Minnesota, 2000–2015. [2019]. Journal of Environmental Health, Vol 82, No. 4, November 2019.
- The Center participated in the MDH booth at Minnesota FarmFest in August 2019. [2019]. The booth included materials and discussion on farm safety and health.
- Norlien, K. Poster and presentation- highlighting work of cosmetology work group. [2019]. MDH Freeman building, Health Equity Showcase, August 27, 2019.
- Norlien K. [2019]. Presentation on Work-Related Asthma to Washington County Public Health. July 26, 2019.

2018-2019

- Presentation on MN Army National Guard Suicide Fatality Reviews. [2019]. University of Minnesota. April 15, 2019.

2017-2018

- Minnesota Pesticide Poisonings 2000-2015. [2018]. Council of State and Territorial Epidemiologists Annual Conference. West Palm Beach, FL June 2108.
- CDC. Notes from the Field: Occupational lead exposures at a shipyard — Douglas County, Wisconsin, 2016. [2017]. MMWR. 2017;66(1):34. (Contributing author)

2016-2017

- Norlien K, Landsteiner A, Williams A, Carlson A. [2017]. Occupational Health Survey of Cosmetologists. Journal of Environmental Health, Vol 79, No. 9, May 2017.
- Submission to NIOSH e-News – April 2017 – "Minnesota Occupational Health Indicators Report". [2017].
- Landsteiner A, PhD MPH. Occupational Health and Safety Indicators. [2016]. Invited Speaker MN Safety Council Advisory Panel, August 2016, St Paul Minnesota
- Landsteiner A, PhD MPH. Occupational Health and Safety Indicators. [2016]. Invited Speaker MN OSHA Advisory Council, June 2016, St Paul Minnesota
- NIOSH eNews "News from our Partners" for March 2016 – Trend and Economic Burden of Agricultural Injury in Minnesota. [2016].
- CDC. Elevated blood lead levels among employed adults — United States, 1994–2013. [2016]. MMWR. 2016;63(55):59–65. (Contributing author)

2015-2016

- Center for Occupational Health and Safety. Minnesota Occupational Health Indicators, December 2016. [2016]. www.health.state.mn.us/communities/occhealth/documents/IndicatorReport2013.14.pdf.
- Landsteiner A, Nyman J, Lindgren P, McGovern P, Alexander B, Williams A. The Economic Impact for Farm Injury in Minnesota, 2004-2010. [2016]. Journal of Agromedicine, 2016: Vol 21(2): 171-177. DOI 10.1080/1059924X2016.1143904
- Landsteiner A, PhD MPH. Affect of Work on Youth. [2016]. Rapid Fire Presentation, Council of State and Territorial Epidemiologists Annual Meeting. June 18 – 23, Anchorage, Alaska.
- Landsteiner A, PhD MPH. Youth Worker Health and Safety Training In Minnesota. [2016]. Rapid Fire Presentation, Council of State and Territorial Epidemiologists Annual Meeting. June 18 – 23, Anchorage, Alaska.
- Landsteiner A, Yendell S, Lindgren P, Olson L, and Williams A. Rates and Trends of Adult Blood Lead Levels in Minnesota, 2005-2012. [2016]. Minnesota Medicine 99(2): 47-50, March 2016.

- Landsteiner A, PhD MPH. [2016]. Occupational Health and Safety Indicators. Invited Speaker MN OSHA advisory council meeting, June 24, 2016. St. Paul, Minnesota
- NIOSH eNews submission: “News from our Partners” for April 2016 – Trend and Economic Burden of Agricultural Injury in Minnesota. [2016].
- Landsteiner A, PhD MPH. A Roll Over Protection Rebate Program – Comments, Concerns? [2016]. Invited Speaker at the Equipalife Annual Symposium, March 13, 2016. St. Cloud, Minnesota
- Landsteiner A, PhD MPH. State of Occupational Health and Safety in MN. [2016]. Invited Speaker ASSE Regional Chapter Annual Conference, February 9, 2016. St. Paul, Minnesota.
- NIOSH eNews submission: “News from our Partners” for Dec 2015 – Minnesota Reporting of Occupational Diseases. [2015].
- Landsteiner A, PhD MPH. Adult Blood Lead Exposures in Minnesota 2005-2012. [2015]. Invited Speaker MDH Lead and Healthy Homes M-CLEAN Symposium, October 6, 2015. St. Paul, Minnesota.
- Landsteiner A, PhD MPH. Occupational Health and Safety Indicators. [2015]. Invited Speaker MN Local AIHA Chapter Meeting, September 18, 2015. Roseville, Minnesota
- CDC. Elevated blood lead levels among employed adults — United States, 1994–2012. [2015]. MMWR. 2015;62(54):52–75. (Contributing author)