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Final Technical Report

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1.0 Executive Summary:

Miners and their communities have been heavily impacted by the opioid epidemic. Studies have shown that miners are more likely to encounter opioids as a result of injuries and to die of opioid overdose than other occupations. Awareness of the potential harms of opioids can play a role in encouraging miners and mine operators to take protective actions. This research project developed a tailored opioid hazard awareness training module that was suitable for use as part of required safety refresher training for the stone, sand, and gravel mining sector. The module was developed in consultation with impacted stakeholders. The 35-minute training discussed recognizing opioids, work-related risk factors for opioid use, how opioids re-wire the brain, tips for the doctor's office, and "harm reduction" approaches such as avoiding stigmatizing attitudes that discourage help-seeking and preventing fatal overdoses through use of naloxone. The module was utilized as part of mine worker refresher training in Massachusetts in 2020 and 800 miners participated. Pre- and post-training surveys found that the training enhanced knowledge and confidence in talking about opioids and providing resources to help those who are struggling. The training received very high ratings from participants.

Following the success of the Massachusetts intervention trial, the training was modified for a national audience and a fully-narrated version of the training was recorded. Availability of the training was advertised in multiple forums including MSHA's training conference, industry association journals and webinars, and through email and phone calls to mine safety trainers across the country. Trainers in more than 20 states requested training materials including the slides, instructors' guide, and participant handouts. The training was used as part of refresher training in several states and more than 200 trainees completed post-training surveys. These were compared with the Massachusetts post-training surveys and were largely comparable. The training, whether in person or on-line, trainer-delivered or trainer-facilitated, resulted in knowledge improvements and positive attitudes. Again, the training was found to be relevant and useful by participants.

In addition to the development and dissemination of the training module, we also developed an Employer Guide to Preventing Opioid Harms in the Stone, Sand and Gravel Mining Sector. This guide provided succinct information and critical tools in line with the suggestions and concerns of stakeholders who were interviewed prior to its development. Additionally, the guide included best practices drawn from the public health literature, and tools such as model drug testing programs and recovery-friendly workplace components. The guide was reviewed by medical, public health and legal experts and made available, along with the training materials at <https://www.uml.edu/Research/CPH-NEW/education-training/Opioid-Hazard-Awareness/> Industry channels including association magazines, webinars, and meetings, such as the interagency Miners' Health Partnership, were utilized to disseminate the resource and solicit feedback.

Significant accomplishments of this project include published manuscripts, multiple presentations, and a research award for the investigator in recognition of the work. The greater accomplishment is the profound reach of the effort which continues as MSHA develops guidance and training for the entire mining sector based on the work of this project. The message of the training and the guidance in the Employer Guide is that everyone can do something to reverse the terrible impact of the opioid epidemic. This project is a contribution to that something.

2.0 Problem Statement and Objective:

The opioid epidemic has impacted the mining workplace in many ways. Yet, when we began this project, there were very limited mining-specific resources available to address the issue. Virginia, West Virginia, and Kentucky instituted regulations to remove individuals from the mining workforce who may have substance use issues. However, workplace factors, such as unsafe conditions and ergonomic risk factors, can precipitate opioid use, and may lead to the unintended diversion of opioids in miners' homes. There was a need for prevention interventions tailored to the context of miners' health and safety training and, also, feasible and effective prevention program guidance for mine operators and employers.

Miners face physically-demanding work and are at greater risk of injury – two factors that have been found to be correlated with increased risk for opioid overdose (Harduar Morano, 2018; Hawkins et al., 2019). Robinson et al.,'s recent study documented that miners report more pain than those in other occupations and noted that "Higher burden of prescription opioid use, prescription opioid-related deaths, and suicide rates among workers in the mining and construction sectors may be consequences of the high prevalence of MSDs and resulting musculoskeletal pain in both sectors (Robinson et al., 2023). The Workers' Compensation Research Institute found that injured workers in the "extraction" sector, which principally includes mining, were more likely to receive opioids for an injury and prescriptions of higher dose and longer duration than other types of workers (Thumula & Liu, 2018). Not only are the workers themselves at risk of long-term opioid use and potential opioid use disorder, but family members and others living in their households have greater exposure to opioids as a result of these higher prescribing rates (Park & Wu, 2020).

Geographic analyses have found that coal-dependent counties have higher opioid deaths (Metcalf & Wang, 2019; Monnat, 2018). Journalists have documented that mining communities were targeted by pharmaceutical companies for opioid sales (Eyre, 2020; Macy, 2019; Quinones, 2019). Higher background drug use, including higher rates of self-reported prescription opioid and illicit drug use may normalize opioid use in mining communities (Gu et al., 2021; Ompad et al., 2019). Mining has high rates of upstream risk factors related to opioid prescriptions including long working hours (Balogun & Smith, 2020; Friedman et al., 2019; Le et al., 2022); injuries (Applebaum et al., 2019; Bureau of Labor Statistics, U.S. Department of Labor, 2021); musculoskeletal disorders (Balogun & Smith, 2020) and overall physical demands (Gallagher, 2021). All of these factors contribute to a greater potential exposure to opioids.

Thus, education about opioids and reduction in potential exposure to opioids may be a potent and feasible strategy for the prevention of problematic opioid use and overdose deaths among miners (G. Franklin et al., 2015; G. M. Franklin et al., 2012; Shaw et al., 2020). We hypothesized that miners and their families would benefit from training programs that provide tailored and evidence-based knowledge and skills to recognize opioid hazards, prevent addiction, and reduce stigma around help-seeking. We also wanted to provide mine operators with policy guidance on identifying risk factors for opioid use, drug-free and recovery-friendly workplace policies, benefits plans that encourage quality and cost-effective care, and stocking naloxone (overdose reversing) in the first aid kit. Employers' policies and workplace culture can play a profound role in setting the stage for either negative outcomes that result in overdose death or in positive ones that support recovery. Further, best practice policies could protect them from liability while sustaining a work environment supportive of the prevention, response and treatment programs that can save lives and help to reverse the crisis.

The **goal** of the research that we undertook was to provide effective training and guidance to empower sand, stone and gravel miners and their employers to recognize and address opioid hazards. Following a trial of the intervention in Massachusetts, we generated materials for dissemination to the broader mining community -- to and beyond the sand, stone and gravel sector. Our **specific aims** were to:

1. Develop a tailored and compelling training curriculum related to opioid safety hazards and prevention in the sand, stone, and gravel industry.
2. Deliver the training as part of the annual MSHA refresher training in Massachusetts.
 - a. Evaluate effectiveness of the training in terms of improved trainee knowledge, attitudes and skills related to opioid hazard awareness and injury prevention.
3. Develop and disseminate a relevant sand, stone, and gravel mining operator employer guide to assist operators in developing their own policies, practices and training to identify and prevent opioid-related hazards.
 - a. Evaluate effectiveness of the guide through a survey of employers who receive it.
4. Produce and disseminate training materials and employer guidance that can be utilized in other mining sectors.

The **objectives** related to these aims are:

- To develop a tailored and compelling training, we would assess training needs, relevance and context
- To deliver the training we would embed the developed module in the required MSHA refresher training in both MA DLS and operator training contexts
- To evaluate the effectiveness of the training, we would compare the responses of trained workers before and after training using appropriate statistical tests
- To develop the employer guide, we would interview operators and conduct background research to identify feasible best practices responsive the employer needs
- After disseminating the guide to operators, we would evaluate the guide by surveying employers who have engaged with the material in the guide
- To increase the reach and utility of this research, we would modify the materials for general applicability beyond the sand, stone and gravel sector
- To disseminate the materials, we would make them available to public agencies and industry associations, as well as through the Alpha Foundation

3.0 Research Approach:

Our project adopted an intervention development, evaluation, and dissemination time-series study design without a comparison intervention. We targeted our intervention to impact annual refresher training in years 2020-2023, beginning in Massachusetts and then nationally. Following formative assessment consisting of literature scans and interviews with stakeholders, we developed a relevant and potentially impactful tailored training. We developed training materials, including an instructors' guide, and we trained trainers to deliver it in the Massachusetts refresher training series offered by the Massachusetts Department of Labor Standards (MA DLS) and to companies' employees directly.

The training presentation was developed from discussion with mine safety trainers and mine operators and from previously developed trainings for construction workers and others (Roelofs, Sugerman-Brozan, et al., 2021). The training content included recognizing which medications are opioids, work-

related risk factors for opioid use, prevention strategies such as ergonomics and tips for the doctor's office, and "harm reduction" approaches such as avoiding stigmatizing attitudes that discourage help-seeking and preventing fatal overdoses through use of naloxone. The training concluded with resources for helping someone struggling with substance issues. (The training slides are included in the Appendix). While the time available for discussion was quite short, one slide encouraged trainees to think about questions such as "Should doctors be able to say someone is 'fit for duty' if they are taking opioids?" Training materials were reviewed by experts in mine safety, trainers, and mine operators and revised according to their recommendations.

In addition to the slide presentation, an instructors' guide was developed to add interactive elements, clarify slide content, and relay training procedures including administration of the pre- and post-training surveys. A participants' guide was also developed and inserted into the MA DLS Refresher Training "Book" for all participants. "Train-the-trainer" sessions were held to train the two trainers who had been hired to deliver the training during the MA DLS-scheduled MSHA refresher trainings. One consultant trainer began his career as a sand and gravel miner and eventually retired from the position of safety director in this industry. Both had immediate family members who had been impacted by the opioid epidemic. Additional trainers included the investigator, company health and safety directors, a consultant trainer, and the staff of the MA DLS MSHA training program.

We used anonymous pre- and post-training surveys to evaluate the impact of health and safety training on trainee knowledge, attitudes and skills. Surveys were administered to all participants on paper immediately preceding and after the training. The pre-training survey included basic demographic and trainee characteristics questions including if they held a Commercial Drivers' License (CDL), their age, and their experience with injuries and opioids, such as having experienced physical pain related to work that lasted one week or more in the past 12 months.

These questions related to risk and protection factors for opioid use. For example, older workers have greater risk of musculoskeletal pain. Workers with CDL would be subject to drug testing and would not be permitted to drive while taking opioids according to federal Department of Transportation rules. Eight multiple choice and true/false questions related to opioid hazard knowledge and attitudes were included on both the pre-training and the post-training survey. The post-training survey also included four questions related to training quality and space for comments. (Surveys are included in the Appendix). Questions were drawn from the training content, interpretation of questions to assess stigma, and prior surveys used by the investigator. Surveys were anonymous and therefore unmatched from pre- to post-training. Human subject participation and procedures were approved by the University of Massachusetts Institutional Review Board (#19-100-EXP dated 7/12/19).

Following the success of the first year, we revised the training to apply to a national audience and we began efforts to disseminate the training as widely as possible with a post-test. In preparation for national dissemination, we made slight modifications to make the training applicable nationally, revised the slide-by-slide instructor's manual, and we recorded a video-based version of the training on the Brainshark platform. (All materials were and are available at <https://www.uml.edu/Research/CPH-NEW/education-training/Opioid-Hazard-Awareness/>). The Brainshark version allowed the trainers to facilitate the training by advancing the videos of the investigator presenting the training and engaging trainees in poll questions and discussion. A revised post-training survey of trainee characteristics, opioid hazard knowledge and attitudes, and training impact and quality was included with the training package. The survey was available in paper form to be mailed back to the investigator and on-line accessed from a QR code at the conclusion of the training.

Paper surveys received from trainers were entered by hand into the Qualtrics/on-line survey database. In addition to recording responses, we noted if the survey was on-line or paper, from which state, and if it resulted from a trainer-delivered or the trainer-facilitated Brainshark version. The analysis for this study included statistical, descriptive and qualitative strategies. We deployed student T-test/ANOVA, as appropriate, to evaluate:

- significant differences between pre and post-training aggregated test scores on key knowledge, attitude and skill domains
- differences in post-training survey scores between the Massachusetts and national cohorts.

Response frequencies and means were calculated, along with comparisons between Massachusetts post-training surveys and those from the national dissemination and between trainer-delivered slides and the narrated Brainshark version facilitated by the trainer. Chi-square tests were performed to determine if the answers from the national cohort were significantly different from those of the 2020 Massachusetts cohort and if training modality resulted in different responses.

We used informal thematic analysis of qualitative key informant interviews to determine the important context and background from miners and mine operators and health and safety trainers and other relevant stakeholders to tailor the development of training and guidance materials.

While the national training was underway, we developed the Employer Guide by, again, interviewing stakeholders to determine pertinent and impactful content, drafting the material and then having it reviewed by an attorney and the NIOSH Office of *Total Worker Health*[®]. The Employer Guide was then advertised through our dissemination channels including industry associations and publications.

4.0 Research Findings and Accomplishments:

Here we report on the findings of the following research activities:

- the Massachusetts training trial which relates to **Specific Aim 1**: Develop a tailored and compelling training curriculum related to opioid safety hazards and prevention in the sand, stone, and gravel industry; **Specific Aim 2**: Deliver the training as part of the annual MSHA refresher training in Massachusetts; and **Specific Aim 2a**: Evaluate effectiveness of the training in terms of improved trainee knowledge, attitudes and skills related to opioid hazard awareness and injury prevention.
- the national training and dissemination activities which relate to Specific Aim 1 and 2a as well as **Specific Aim 4**: Produce and disseminate training materials and employer guidance that can be utilized in other mining sectors.
- the Employer Guide which relates to **Specific Aim 3**: Develop and disseminate a relevant sand, stone, and gravel mining operator employer guide to assist operators in developing their own policies, practices and training to identify and prevent opioid-related hazards as well as Specific Aim 4.

4.1 Massachusetts Experience

The Opioid Hazard Awareness Training for Sand, Stone and Gravel Workers module was used in 20 MSHA Refresher Training Days in January and February 2020 in Massachusetts. At least 800 workers were trained. For the 14 trainings that were sponsored by MA DLS under an MSHA Training Grant,

project trainers conducted the training and administered the pre- and post-training surveys to the 762 miners and others who attended the trainings. A total of 598 pre-surveys and 623 post-surveys were returned, for participation of 78% and 82%, respectively. For the remaining “private” trainings, operators, their consultants, or MA DLS staff conducted the trainings and used our module, but did not administer surveys.

Description of the Participants

One third of the respondents reported their job title as “miner” and another third reported their title as “other” including laborer, driller, welder, or supervisor – essentially mining job titles. The remaining third consisted of maintenance, multiple titles, and truck drivers. The age of respondents ranged from 18 to 76 (mean = 45) and was somewhat older on average than the general working age population: 55% were 45 years old or older (U.S. Bureau of Labor Statistics, n.d.). Sixty-five percent of the respondents had more than 10 years’ experience in their job or a similar one. More than 40% of respondents had CDLs. Thirty percent (n=175) reported having had work-related pain in the past year, and seven percent (n=44) had received an opioid prescription for work-related pain. Reporting work-related pain was associated with reporting having gotten prescription opioids ($p < 0.01$).

Pre- to Post-Training Changes in Knowledge and Attitudes

Table 1 shows pre- and post-training survey responses and group-level changes. Those reporting good or very good knowledge about opioid side effects increased from 71% to 91% ($p < 0.01$). Additionally, affirmative response to the question regarding knowledge of resources to help a co-worker struggling with substance issues increased from 67% to 88% ($p < 0.01$). There were no statistically significant changes in comfort in discussing opioid issues, either with a doctor or a co-worker, nor in response to questions regarding stigma. For these questions, responses were in line with positive attributes (high comfort, confidence and non-stigma) both pre- and post-training.

We analyzed subgroup differences between CDL holders versus those without and by age. Largely there were no differences in responses, however CDL holders were more likely to answer “true” to the question about whether addiction can happen to anyone (an indicator of not holding stigmatizing attitudes) than those without CDL ($p < .01$). Those under age 50 were more likely to report good or very good knowledge of side effects ($p < 0.03$) both pre- and post-training.

Table 1: Opioid Hazard Awareness Pre- and Post-Training Responses, Massachusetts 2020					
	Pre-Training		Post-Training		Change*
How would you rate your knowledge about the side effects of opioid-based pain medications?	n=	590	n=	619	
Very good knowledge	138	23%	242	39%	67%
Good knowledge	325	55%	321	52%	-6%
Poor knowledge	92	16%	42	7%	-56%
Very poor knowledge	35	6%	14	2%	-62%
Opioids work by reducing the causes of pain in the body	n=	575	n=	613	
TRUE	333	58%	239	39%	-33%
FALSE	242	42%	374	61%	45%
Opioid addiction can happen to anyone	n=	594	n=	616	
TRUE	573	96%	592	96%	0%
FALSE	21	4%	24	4%	10%
People with opioid addiction can never recover	n=	585	n=	614	
TRUE	32	5%	33	5%	-2%
FALSE	553	95%	581	95%	0%
If a doctor gives you a prescription for opioid-based pain medication, you know that it's safe to take while working	n=	576	n=	614	
TRUE	33	6%	40	7%	14%
FALSE	543	94%	574	93%	-1%
How confident would you feel talking to a doctor about safety concerns of opioids?	n=	583	n=	613	
Very high confidence	267	46%	297	48%	6%
High confidence	263	45%	249	41%	-10%
Low confidence	39	7%	47	8%	15%
Very low confidence	14	2%	20	3%	36%
How comfortable would you feel talking to a co-worker about your own use of opioids?	n=	562	n=	602	
Very high level of comfort	189	34%	208	35%	3%
High level of comfort	187	33%	219	36%	9%
Low level of comfort	95	17%	106	18%	4%
Very low level of comfort	91	16%	69	11%	-29%
If a co-worker asked you about where to get help for someone struggling with opioids, do you know at least one good resource you could refer them to?	n=	587	n=	616	
Yes	396	67%	541	88%	30%
No	191	33%	75	12%	-63%

**Difference in proportion from pre- to post-training. Chi-square tests evaluated statistical significance of changes and are described in the text.*

Training Evaluation

Overall, trainees found the training useful and relevant (Table 2). Ninety-four percent would recommend the training. Many of the voluntary written comments were also positive; a few questioned whether the training related to miner safety, or they disagreed with the view that addiction was a disease (which was included in the training’s discussion of substance use disorder). In the interviews, trainers expressed satisfaction with their preparation to provide the training and regarded the training experience as positive.

Table 2: Opioid Hazard Awareness Training Evaluation, Massachusetts 2020		
Training increased my awareness of the hazards of opioids	n=614	
Strongly Agree/Agree	531	86%
Disagree/Strongly Disagree	83	14%
The training helped me understand what can be done to prevent opioid addiction	n=606	
Strongly Agree/Agree	546	90%
Disagree/Strongly Disagree	60	10%
I can apply what I learned in this training to protect myself and others from opioid hazards	n=605	
Strongly Agree/Agree	557	92%
Disagree/Strongly Disagree	48	8%
I would recommend this training	n=604	
Strongly Agree/Agree	566	94%
Disagree/Strongly Disagree	38	6%

4.2 National Dissemination and Training Intervention Results

Promotion and Dissemination of the Training

November 2020 through January 2023, we promoted a revised national version of the training for use by mine safety trainers throughout the U.S. The investigator made numerous presentations highlighting the findings from Massachusetts and encouraging adoption of the module. These presentations included to the annual Mining Safety and Health Administration-sponsored “Training Resources Applied to Mining” conference, meetings of regional and national industry association safety leaders, and a meeting of the Miners Health Partnership, an inter-agency stakeholder group. In collaboration with an industry-specialized communications firm, Stone Age Communications, articles were published in industry journals including *Rock Products*, *Stone, Sand and Gravel Review*, and *Mining Engineering* (Dunphy, 2022). Mine safety trainers who receive funds to conduct annual and new miner safety from the Mine Safety and Health Administration were emailed and called with information about the training.

As shown in Table 3, we received over 200 post-training surveys from several states November 2020 through January 2023. While the training was requested directly by trainers in over 20 states, we received surveys principally from Arkansas, Michigan, Oregon, New Jersey where trainers effectively facilitated the collection of paper surveys or trainees accessing the on-line survey. We do not know the

total number of individuals who received the training. Approximately half the surveys were from trainer-delivered slides and the remainder were from trainers using the narrated Brainshark version. While all of the Massachusetts trainings were delivered in-person in January and February 2020 prior to the COVID-19 pandemic, some of trainings delivered during the national dissemination were delivered on-line due to pandemic restrictions on in-person gatherings.

As with the Massachusetts cohort, most training participants were experienced and older: half the sample were over age 45 and had more than 10 years in mining work or similar work. A few participants received this training as part of required new miner training. Most received it as part of refresher training. Almost one-third were mine contractors; half mine employees, and the remainder were others including trainers, regulators, and public health professionals. Of the mine employees, half were equipment operators and the remainder more or less equally divided between management, maintenance and other. In response to the question “In the past 12 months, have you had physical pain related to your work that lasted one week or more?,” 30% responded “Yes,” while 40% reported physical pain not related to work. Ten percent had been prescribed an opioid-based pain medication in the prior 12 months.

Table 3 Opioid Hazard Awareness Trainee Characteristics

Training Location	#	%	Job Type	#	%
Oregon	92	44%	Contractor	63	31%
Arkansas	54	26%	Mine Employees	105	52%
Home/Zoom*	21	10%	<i>Equipment Operator</i>	59	56%
New Jersey	20	10%	<i>Management/Administration</i>	18	17%
Michigan	6	3%	<i>Other</i>	13	12%
Other	15	7%	<i>Maintenance Only</i>	15	14%
<i>Total</i>	208		Other	34	17%
Type of Training			<i>Total</i>	202	
Refresher	178	88%	Age		
New Miner	8	4%	25 or younger	13	6%
Other	16	8%	26-35	44	21%
<i>Total</i>	202		36-45	39	19%
Years doing this/similar work			46-55	47	23%
<1	12	6%	56-65	53	26%
1-5	44	21%	66+	10	5%
6-10	40	19%	<i>Total</i>	206	
11-20	35	17%			
>20	75	36%			
<i>Total</i>	206				

*Most from Michigan

^% of mine employees

Table 4 shows that trends in post-training survey responses were very similar between the Massachusetts trainees and the national cohort. There were some significant differences (p=0.05), with Massachusetts trainees showing somewhat more favorable responses in the areas of knowledge about

opioid-based medications, confident and comfort in talking to a doctor about the safety concerns of opioids and or to a coworker about their own use of opioids, and ability to refer coworkers to resources related to treatment or support for those struggling with opioids. There were no significant differences in our “stigma” measures (who gets addicted and possibility of recovery) between the training cohorts.

Table 4: Opioid Hazard Awareness Post-Training Responses

	National		MA		Sig. Dif
How would you rate your knowledge about the side effects of opioid-based pain medications?	n= 203	%	n=619	%	
Very good knowledge	52	25.62	242	39.10	13.48
Good knowledge	122	60.10	321	51.86	8.24
Poor knowledge	23	11.33	42	6.79	
Very poor knowledge	6	2.96	14	2.26	
Opioids work by reducing the causes of pain in the body	n=199	%	n=619	%	
TRUE	55	27.64	239	38.99	11.35
FALSE	144	72.36	374	61.01	11.35
Opioid addiction can happen to anyone	n=203	%	n=616	%	
TRUE	198	97.54	592	96.10	
FALSE	5	2.46	24	3.90	
People with opioid addiction can never recover	n=202	%	n=614	%	
TRUE	4	1.98	33	5.37	
FALSE	198	98.02	581	94.63	
If a doctor gives you a prescription for opioid-based pain medication, you know that it's safe to take while working	n=200	%	n=614	%	
TRUE	5	2.50	40	6.51	
FALSE	195	97.50	574	93.49	
How confident would you feel talking to a doctor about safety concerns of opioids?	n=200	%	n=613	%	
Very high confidence	81	40.50	297	48.45	7.95
High confidence	98	49.00	249	40.62	8.38
Low confidence	15	7.50	47	7.67	
Very low confidence	6	3.00	20	3.26	
How comfortable would you feel talking to a co-worker about your own use of opioids?	n=196	%	n=602	%	
Very high level of comfort	34	17.35	208	34.55	17.2
High level of comfort	76	38.78	219	36.38	
Low level of comfort	65	33.16	106	17.61	15.55
Very low level of comfort	21	10.71	69	11.46	
If a co-worker asked you about where to get help for someone struggling with opioids, do you know at least one good resource you could refer them to?	n=199	%	n=616	%	
Yes	144	72.36	541	87.82	15.46
No	55	27.64	75	12.18	15.46

Table 5 shows that there were no significant differences between Massachusetts and national respondents in answers to questions regarding training quality. Nor were there differences in training

reception where the trainer presented the slides versus the Brainshark version. Respondents overwhelmingly felt that the training increased their awareness, that they could use what they learned to prevent opioid harms, and that they would recommend the training.

Table 5: Opioid Hazard Awareness Training Evaluation

	National		MA	
	n=199	%	n=614	%
Training increased my awareness of the hazards of opioids				
Strongly Agree/Agree	176	88.44	531	86.48
Disagree/Strongly Disagree	23	11.56	83	13.52
I can apply what I learned in this training to protect myself and others from opioid hazards				
Strongly Agree/Agree	186	93.94	557	92.07
Disagree/Strongly Disagree	12	6.06	48	7.93
I would recommend this training				
Strongly Agree/Agree	178	89.90	566	93.71
Disagree/Strongly Disagree	20	10.10	38	6.29

We also analyzed the national training cohort surveys to determine if there were significant differences between those who received the training from an in-person trainer (Michael Peelish) who presented the slides (principally in Oregon and New Jersey) and those who participated in trainings where a trainer facilitated the presentation of the narrated video (Brainshark) version (principally Arkansas and Michigan). Survey responses followed the trends described above, however results were slightly more favorable where the trainer was in-person and presented the slides himself (analysis available on request).

4.3 Employer Guide

Our intention was to widely disseminate the Employer Guide and conduct brief surveys with those who accessed it. Unfortunately, we were not able to conduct a formal evaluation of the Guide by this method because of challenges in tracking those who downloaded the guide or accessed it in other ways. However, we were diligent in the review of the guide by several methods. First, the guide was reviewed by distinguished experts including Dr. Bill Shaw, an expert in Return to Work, occupational psychology, and substance use and work; Dr. Casey Chosewood and Jamie Osborne, the leadership of NIOSH’s Total Worker Health program; Michael Peelish, JD, advisor to the Alpha Foundation and the mining community on legal issues related to opioids and safety on mine sites, and safety directors of several mining companies. We tracked comments and appreciation of the guide through emails (previously reported to the Foundation). The Guide was presented in numerous forums and we responded to comments and questions in those venues. Finally, it was discussed as part of the Miners’ Health Partnership’s listening sessions held in early 2023. Dr. Carol Nixon of NIOSH has made available a report of those sessions and the feedback is being incorporated into a revised version. Evidence of the utility of the guide is demonstrated by the efforts currently underway by the investigator to assist MSHA in developing opioid hazard awareness program guidance for mining employers largely based on this guide.

4.4 Accomplishments

In addition to the accomplishments of the specific aims of the project, there are some additional notable accomplishments. In 2023 I received the Academic/Applied Research Award at the Construction Working Minds Summit in Kansas City, MO in part in recognition of my work on this project and its impact. The project was featured in the [video](#) that was made in support of the award. As is mentioned above, as a result of this project, I have been appointed as an advisor to MSHA for the development of training and guidance to be disseminated through the agency with the aim of reaching the entire mining sector. Finally, the work produced by this grant has been featured in several high profile arenas include the February 2023 Department of Labor Roundtable on Opioid Hazards in Mining, Interagency Miners' Health Partnership, and the Miners' Wellness ECHO Program.



5.0 Publication Record and Dissemination Efforts:

Publications:

Roelofs, C. and J. Hansen, "Dissemination and Evaluation of An Opioid Hazard Awareness Training for Stone, Sand, and Gravel Miners" Submitted to the Journal of Prevention, April 28, 2023

Dunphy, T. (2023, February). Employees & Opioids. Stone, Sand and Gravel Review.

https://www.stonesandandgravelreview-digital.com/nsas/0123_january_february_2023/MobilePagedArticle.action?articleId=1847437&lm=1682629478000#articleId1847437

Roelofs, C. (2022). Results of an opioid hazard awareness training intervention for stone, sand and gravel miners. Mining Engineering Magazine, 74(4), 42–44.

<https://me.smenet.org/abstract.cfm?articleID=10562&page=42>

Dunphy, T. (2022). Free Opioid Guide Provides Practical Tips, Sample Policies. Rock Products Magazine.

<https://rockproducts.com/2022/08/16/free-opioid-guide-provides-practical-tips-sample-policies/>

Roelofs, C. (2021). Results of an Opioid Hazard Awareness Training Intervention for Stone, Sand, and Gravel Miners. Mining, Metallurgy & Exploration. <https://doi.org/10.1007/s42461-021-00515-7>

Presentations:

"Research Roundtable: Opioid Use in the Mining & Excavation Industries," Department of Labor Chief Evaluation Office, February 6, 2023

"Opioid Hazard Awareness for the Mining Sector," Project ECHO Miners' Wellness TeleECHO Program (New Mexico), April 26, 2023

"Training and Programs for Opioid Hazard Awareness," Miner Health Partnership Meeting, January 25, 2022

"Opioid Hazard Awareness and Total Worker Health," Center for the Promotion of Health in the New England Workplace, December 9, 2021

"Opioid Hazard Awareness for the Sand, Stone and Gravel Sector," Training Resources Applied to Mining Virtual Conference, October 2020 and November 2021

“Opioid Hazard Awareness for the Sand, Stone and Gravel Sector,” presented by Michael Peelish, Law Office of Adele Abrams, PC to the Pennsylvania Aggregates and Concrete Association in November 2021

“Opioid Hazard Awareness for West Virginia Coal Mining,” West Virginia Board of Coal Mine Health and Safety, September 29, 2021

“Opioid Hazard Awareness for the Sand, Stone and Gravel Sector,” North Carolina Mine Safety & Health Conference, September 9, 2021

“Opioid Hazard Awareness for the Sand, Stone and Gravel Sector,” National Stone, Sand and Gravel Association Webinar, July 29, 2021

“Opioid Hazard Awareness for the Sand, Stone and Gravel Sector,” National Stone, Sand and Gravel Association Bi-Monthly Producers-Only Safety Meeting, July 7, 2021

Dissemination of the materials continues. The Center for the Promotion of Health in the New England Workplace will continue to host the Opioid Hazard Awareness for the Stone, Sand and Gravel webpage and materials until they migrate to a new MSHA webpage devoted to Miner Wellness which is in development. That page had over 1,400 visits and 816 unique visitors from November 2020 to May 2023. 290 of those visitors stopped by the page after the Employer Guide was added to the page in July 2022.

6.0 Conclusions and Impact Assessment:

This research project was the first study to develop, deploy and disseminate opioid hazard awareness training in the stone, sand, and gravel sector with the goal of improving miner knowledge, attitudes and skills related to opioids. Additionally, we produced tailored and practical advice to mine operators so that they could develop their own opioid hazard awareness programs and this guidance will be disseminated nationally by the federal mining agency. While we are not able to link these interventions to declines in substance use, misuse, disorders, overdoses, drug-related accidents and other health outcomes, our intermediate outcomes demonstrated that we achieved significant intermediate goals in both the Massachusetts stone, sand and gravel sector and nationally.

We demonstrated the feasibility of embedding this training in required refresher training and disseminating materials through industry associations and government agencies. The training was relatively short and was able to be adapted to an existing training infrastructure. We were able to prepare several trainers -- none with background in substance use education -- to deliver the training and supported these trainers with a trainer’s instruction manual and participant handout. We responded to the needs of the industry by creating a fully-narrated version of the training and by directly addressing sector concerns in the employer guide. Our surveys demonstrated increased knowledge about opioids and confidence in trainees’ abilities to navigate doctors’ offices and share resources with co-workers. The training was very positively received by the trainees who thought that it was information that they could use. Additional strengths of this study include the reach of the training: approximately 80% of the workforce in Massachusetts and trainers in half of the states in the US.

Overall, the data show similarities between the Massachusetts post-survey responses and those received following national dissemination. We found that following a short training, trainees were able to demonstrate knowledge related to opioid medications and low levels of stigma as indicated by questions about the possibility of recovery and who can become addicted to opioids. The ability and willingness to talk to doctors and coworkers about opioid issues was also high. The questions that showed the greatest (significant) difference between the two cohorts related to comfort in talking with a co-worker about opioids and knowledge of resources to refer someone to. These differences may

follow from use of a generic training that was not tailored to local audiences with the addition of local resources. Responses were comparable between trainer-delivered training and use of a pre-recorded narrated training that was facilitated by a local trainer.

It is notable that survey participants reported high levels of work-related and non-work-related pain. Almost a third of respondents reported work-related pain which is similar to levels reported in construction (CPWR – The Center for Construction Research and Training, 2017). That as many as 10% of the national trainee survey respondents had been prescribed an opioid-based pain medication in the prior 12 months – a period encompassing 2020-2022 – indicates the continuing importance of opioid hazard awareness for mine workers.

This study demonstrates that training mine workers, a “high risk” worker population, can be a feasible and potentially effective strategy to reduce the likelihood that work and non-work-related pain facilitates opioid dependence, use disorder, misuse, and/or overdose. This study achieved national impact and recognition and the research products that have been produced as a result of support from the Alpha Foundation are highly valued by miners and mine operators.

7.0 Recommendations for Future Work:

Based upon the on-going impacts of opioids on mining communities, the following areas could be investigated as assessment and/or intervention studies with the assistance of insurers, healthcare providers, mine operators, miners’ unions and local agencies:

- prevalence of use of opioids and reasons for opioid use among miners, including miners’ perspectives on the issue and perspectives from different mining sectors (coal, surface mining, metal/non-metal, different areas of the country)
- association of opioid use and preventable work-related factors such as safety conditions, ergonomics, long hours, etc.
- interactions of mining/work-related factors and other factors such as rurality, age, healthcare access, “machismo/provider” ethic, alternative employment
- interaction of mining/work-related factors (precarity/seasonality, physical demand, hazards/injury, long hours, illness risk, wages, unionization)
- employers’ willingness to engage, prevent, and support miners who are struggling and also with prevention initiatives and work-supported recovery programs
- opioids, mental health, and suicide among miners
- alternative pain management and wellness programs for miners.

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9.0 Appendices: (Posted separately on Alpha website)

Training Slides (Stone, Sand, and Gravel and All sectors)
Instructors' Guide (Stone, Sand and Gravel and All Sectors)
Pre- and Post-Training Surveys
Participant Handout
Employer Guide (SSG and All Sectors)