HHS Public Access

Author manuscript

Ann Work Expo Health. Author manuscript; available in PMC 2021 August 31.

Published in final edited form as:

Ann Work Expo Health. 2020 August 06; 64(7): 765–769. doi:10.1093/annweh/wxaa026.

Evaluation of an Occupational Safety and Health Training for Cannabis Cultivation Workers

Carol E. Brown[1], **Erin Shore**[1], **Mike V. Van Dyke**[1,2], **Joshua Scott**[3], **Roberta Smith**[4]

[1]Center for Health, Work & Environment, Colorado School of Public Health, University of Colorado Anschutz Medical Campus

[2]Department of Environmental and Occupational Health, Colorado School of Public Health, University of Colorado Anschutz Medical Campus

[3]2U Inc.

[4]Axion Health

Abstract

Background/Goal—As the commercial cannabis industry grows, there is an increased need to characterize potentially hazardous workplace exposures and provide training to workers to mitigate these exposures with the goal of reducing accidents and injuries from cannabis cultivation, processing, and manufacturing. Public health and safety stakeholders in Colorado developed a worker-focused training designed to improve hazard awareness, recognition, and controls related to commercial cannabis cultivation. This paper describes the evaluation of this training.

Method—The training was a full day, in-person educational experience directed to workers in the cannabis cultivation industry. Training topics included an overview of occupational safety and health hazards, chemical exposures, slip, trips, and falls, repetitive motion, the application of the hierarchy of control including lockout/tagout, machine guarding, and personal protective equipment, among others. Evaluation surveys assessed attendee demographics, perceived job hazards, confidence to change workplace practices, knowledge, training relevancy and quality, intent to change behavior, as well as barriers and resources.

Results—A total of 208 people attended the safety trainings. 134 participants (64%) completed the pre-training survey and 107 (51%) completed the post-training survey. Respondents provided high ratings for the quality and relevance of the training, with 91.3% of respondents rating the training very good or excellent. Before the training, the attendees listed their most concerning safety and health issues as exposure to pesticides and other chemicals (65.7%), absorbing chemicals through the skin (56.7%), slips, trips, and falls (52.2%), and respiratory hazards (50.7%). After the training, they reported the most concerning hazards to be slips, trips, and fall hazards (65.4%), ergonomic problems (64.5%), and respiratory issues (61.7%). There was a statistically non-significant increase in knowledge scores from 67.1% correct to 76.0% correct.

The authors declare no conflict of interest relating to the material presented in this article. Its contents, including any opinions and/or conclusions expressed, are solely those of the authors.

Finally, 88.5% of respondents felt extremely or very confident that they could change their own health and safety practices at work.

Conclusions—The training successfully reached cannabis employees in cultivation, compliance and management. Survey respondents felt that the training was of high quality and addressed gaps in their knowledge related to safety and health hazards in the cannabis industry. The workplace safety and health concerns shifted from pre- to post-training. There was a statistically non-significant increase in knowledge. Additional follow-up of training attendees would be beneficial to measure sustained impact of training.

Search Terms:

Cannabis; Workers; Occupational Safety and Health; Training

Keywords

Marijuana; Continuing Education

Introduction

While cannabis remains illegal under federal law, states have enacted numerous laws over the past 20 years to legalize cannabis in some way. California was the first state to legalize the medical use of cannabis in 1996, while Colorado first legalized recreational use of cannabis in 2012. Currently, 33 states and the District of Columbia have legalized some form of cannabis use, either medicinal or recreational (NCSL, 2019). With increased legalization at the state level comes a larger number of people working in the cannabis industry. From just 2017 to 2019, the number of people directly employed in the legal cannabis industry increased from 120,000 to 211,000, a 76% increase (Barcott and Whitney, 2019).

As the industry continues to grow, researchers from the National Institute for Occupational Safety and Health (NIOSH) through their Health Hazard Evaluations (HHE) program, as well as researchers at several academic institutions and state health departments have begun to assess and characterize hazardous workplace exposures, accidents and injuries from cannabis cultivation. Potential hazards identified through assessment, observation and comparison to similar industries include mold exposure, dermal allergens, respiratory allergens, elevated carbon dioxide and carbon monoxide, volatile organic compounds (VOCs), pesticides, chemical disinfectants and physical hazards such as compressed gas, repetitive motion, workplace violence, working at heights, electrical, noise, lighting, heavy machinery and confined spaces. Potential health effects range from burns and musculoskeletal injuries to dizziness, nausea and respiratory and dermal irritation (Davidson et al., 2018; Marijuana Occupational Health and Safety work Group, 2017; Martyny et al., 2013; NIOSH, 2017; Walters et al., 2018). Given that it’s a relatively young industry, health effects from long-term occupational exposures to marijuana during harvesting and processing are largely unknown (Martyny et al., 2013).

Recommendations based on survey results from cannabis workers in Colorado indicate the need for more formalized health and safety training for cannabis workers, as there are multiple safety and health hazards and on the job training is inconsistent in both quantity and quality (Walters et al., 2018). Training is an effective way to improve knowledge, behavior change, and to reduce injury and illness in a number of occupational safety and health areas (Colligan and Cohen, 2004). Stakeholders from Colorado, organized by the Center for Health, Work & Environment (CHWE) and the Colorado Department of Public Health and Environment developed a training designed to improve hazard awareness, recognition, and controls related to cannabis cultivation. The training was developed for and delivered directly to cannabis industry workers, as opposed to training safety professionals. This article describes the training and its evaluation.

Methods

Stakeholders in Colorado designed the occupational safety and health (OSH) for cannabis workers curriculum. Two full-day trainings were conducted in 2017 and were designed mainly as an in-person experience, though the second training was available by webcast in addition to the in-person experience. Individual subject matter experts from academia, government, and safety organizations delivered the training. Training topics included an overview of occupational safety and health hazards, chemical exposures, slip, trips, and falls, repetitive motion, the application of the hierarchy of control including lockout/tagout, machine guarding, and personal protective equipment, among others. The training was designed to be engaging to the learner and included didactic lectures, small and large group discussion, group knowledge checks utilizing polling software; and small group problem solving.

Evaluation surveys were administered before and immediately after the training. Surveys assessed attendee demographics such as age, gender, and tenure at job. Attendees were also asked about their perceived job hazards, confidence to change workplace practices, knowledge, training relevancy and quality and intent to change behavior. A 10-item knowledge survey was administered pre- and post-training. The evaluation surveys were developed specifically for this training, based on other evaluations administered by the CHWE continuing education program. The development of the evaluation was influenced by the theory of planned behavior (Ajzen, 1991) and the Kirkpatrick four level training evaluation model (Kirkpatrick and Kirkpatrick, 2006). The knowledge questions were developed based on content of training. Data were entered into Qualtrics (2005) and exported to Excel for analysis and reporting. The University of Colorado Multiple Institutional Review Board (COMIRB) provided an exemption for human subjects research, based on the use of program evaluation.

Results

A combined total of 208 people attended the two safety training with 134 (64.4%) completing the pre-training survey and 107 (51.4%) completing the immediate post-training survey. A majority of participants were male (69.4%) and there was a large range in age and job tenure with an average age of 34.8 years (SD = 9.4) and an average job tenure

in the cannabis cultivation industry of 2.6 years (SD = 2.2). Attendees of the training fell into three main job categories: senior management (18.7%), cultivation employees (57.9%), and employees responsible for regulatory compliance (29.9%). An additional 18.7% were classified as “other”. Most (81.3%) held supervisory positions at work.

The evaluation results indicated that 86.5% of respondents agreed or strongly agreed that the training addressed a gap in their knowledge and 91.3% gave an overall rating to the training of very good or excellent. There was a statistically non-significant increase in knowledge from the pre- to post-training knowledge (average 67.1% pre-training to 76.0% post-training). Average increases were seen for 7 of 10 knowledge questions after the training, with the biggest increases for items related to OSHA’s General Duty Clause (+25.7%), hazard control (+15.3%), and machine guarding (+14.9). A free response question gave respondents the opportunity to report changes they intended to make in their workplace as a result of the training. The most common responses included conducting more trainings at their workplace; making changes to safety policies and programs; improving slip, trip, and fall hazards; better enforcing lockout/tagout procedures; increasing communication about OSH in the workplace; and performing ergonomic and hazard assessments.

Attendees were also asked about the tools and resources that would help them make changes to OSH in their workplace. The most common responses were OSHA assistance, financial resources, and more training and education. Potential barriers identified included budget, workplace culture, resistance from employees, and management buy-in. Despite barriers reported, respondents indicated high levels of confidence in their ability to make changes in their workplace (86.0% felt very or extremely confident).

We also examined self-reported concerns regarding workplace OSH exposures. On the pre-training survey, respondents expressed the highest workplace concerns regarding exposure to pesticides and other chemicals (65.7%), absorbing chemicals through the skin (56.7%), slips, trips, and falls (52.2%) and respiratory hazards (50.7%). Results from the survey administered after the training showed an observed shift in responses with slips, trips, and falls rising to the top of concerns (65.4%), followed by ergonomic issues (64.5%) and respiratory issues (61.7%). Figure 1 shows the full results. We were also interested in examining the differences in OSH concerns by job category. As seen in Figure 2, those employees who worked in compliance jobs had higher levels of concerns for most of the OSH exposures than the other job categories. This is particularly evident for ergonomic issues, where 65.6% of those in a compliance role indicated this was a concern, as compared to 40% of those in senior management or cultivation roles.

Discussion

The training was successful in reaching its intended audience of employees in the cannabis cultivation industry, including cultivators, employees with compliance job duties, and senior management. Results were mixed, but overall positive, with regard to improving health and safety knowledge of attendees. Respondents felt that the training was of high quality and addressed gaps in their knowledge related to health and safety hazards in the cannabis industry. Participants increased their knowledge from pre-training to post-training. This is

supportive of findings in the literature which show that worker safety and health trainings considered more engaging lead to increases in knowledge acquisition and skill development, as well as in overcoming shortcomings in their workplace safety programs (Burke et al., 2006; Colligan and Cohen, 2004).

Respondents of the training indicated a number of recognized workplace hazards were of concern to them, including pesticide and chemical exposures, dermal hazards, ergonomic concerns, and respiratory hazards. The order of these hazards shifted from pre- to immediate post-training, reflecting a better understanding of the musculoskeletal and respiratory hazards that exist in cannabis cultivation facilities. This shift was significant in that suggested a higher awareness of the types of hazards that have been identified as prevalent in the industry. (Marijuana Occupational Health and Safety work Group, 2017; Martyny et al., 2013; NIOSH, 2017; Walters et al., 2018). Workers are able to take this information back to their workplaces and implement changes to their workplaces and their own behavior.

Despite the described barriers and needed resources to improve health and safety in cannabis cultivation facilities, participants reported high intent to change safety behavior following the training. Intentions have been shown to be highly correlated to subsequent behaviors in a number of health-related domains, with meta analyses finding mean correlations between 0.44 and 0.56 (Ajzen and Albarracín, 2007). The literature specific to occupational safety and health intent and behavior change is limited and more follow-up in this area would strengthen our findings.

As with most training interventions, attendance of this training was self-directed and thus had selection bias. Cannabis cultivation workers in businesses that do not value or support safety may not have selected to attend. Further, the survey was designed to evaluate a safety training program and the information collected primarily lent itself to making changes to the training itself. As such, the survey results do not lend themselves to robust statistical analyses. Further, more follow-up of attendees would be beneficial. Originally a 6-month follow-up survey was distributed, but due to low response rate (11.1%) and missing responses, results were not discussed here. A follow-up time point of two to three months would likely yield a larger response and more useful information as to the quality of the training and knowledge retention.

The takeaway from this training and evaluation is that cannabis cultivations workers are highly interested in receiving training around workplace safety and health. The training, which was highly engaging, gave attendees an opportunity to learn about hazards they are most likely to face and develop ways to address them in their own workplace. Furthermore, the training appropriately adjusted the workers' perceived importance of specific hazards to be more in line with literature findings. Based on the rapidly expanding legalized cannabis landscape, we feel that the training and the changes we see pre- and post-training are an important addition to the literature as others continue to develop OSH trainings directed at cannabis cultivation workers.

References

Ajzen I (1991) The theory of planned behavior. Organ Behav Hum 12; 50: 179–211.

Ajzen I, Albarracín D (2007) Predicting and changing behavior: A reasoned action approach. In Ajzen Albarracín, Hornik, editors. Prediction and change of health behavior: Applying the reasoned action approach. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers. ISBN 978-0-8058-5926-3.

Barcott B, Whitney B (2019) Special report: Cannabis jobs count. Available from: URL: https://d3atagt0rnqk7k.cloudfront.net/wp-content/uploads/2019/03/01141121/CANNABIS-JOBS-REPORT-FINAL-2.27.191.pdf (accessed 19 Sept 2019).

Burke MJ, Sarpy SA, Smith-Crowe K, Chan-Serafin S, Salvador RO, Islam G (2006) Relative effectiveness of worker safety and health training methods. Am J Pub Hlth; 96(2): 315–24.

Colligan MJ, Cohen A (2004) The role of training in promoting workplace safety and health. In Barling & Frone, editors. The psychology of workplace safety. Washington DC: American Psychological Association, ISBN 978-1-59147-068-7.

Davidson M, Reed S, Oosthuzen J, O'Donnell G, Gaur P, Cross M, Dennis G (2018) Occupational health and safety in cannabis production: an Australian perspective. Int J Occup Environ Health; 24: 75–85. [PubMed: 30281413]

Kirkpatrick DL, Kirkpatrick JD. (2006) Evaluating Training Programs: The Four Levels. San Francisco: Berrett-Koehler Publishers Inc. ISBN-10 1576753484.

Marijuana Occupational Health and Safety Work Group. (2017) Guide to Worker Safety and Health in the Marijuana Industry. Available from: URL: http://marijuanaindustrygroup.org/wp-content/uploads/2017/02/Guide-to-Worker-Safety-and-Health-in-the-Marijuana-Industry_-FULL-REPORT-1.pdf (accessed 19 Sept 2019).

Martyny JW, Serrano KA, Schaeffer JW, Van Dyke MV. (2013) Potential exposures associated with indoor marijuana growing operations. J Occup Environ Hyg; 10: 622–39. [PubMed: 24116667]

NIOSH (2017) Evaluation of potential hazards during harvesting and processing cannabis at an outdoor organic farm. By Couch J, Victory K, Lowe B, Burton NC, Green BJ, Nayak A, Lemons AR, Beezhold D. Cincinati, OH: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Health Hazards Evaluation Report 2015-0111-3271. Available from: URL: https://www.cdc.gov/niosh/hhe/reports/pdfs/2015-0111-3271.pdf (accessed 19 Sept 2019).

National Conference of State Legislatures. (2019) State medical marijuana laws. Available from: URL: http://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx (accessed 19 Sept 2020).

Qualtrics (2005) Copyright year, 2018. Provo, Utah, USA. Available at: https://www.qualtrics.com

Walters KM, Fisher GG, Tenney L (2018) An overview of health and safety in the Colorado cannabis industry. Am J Ind Med; 61: 451–61. [PubMed: 29537065]

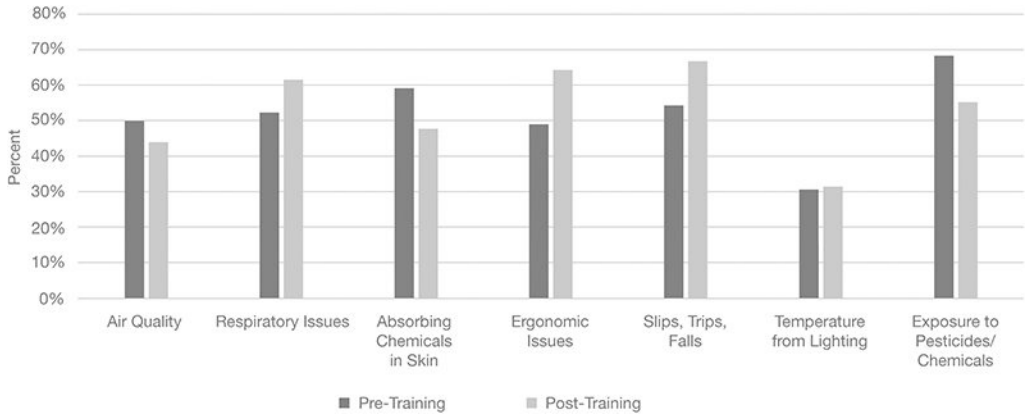

Figure 1:
Occupational safety and health concerns pre- and post-training.

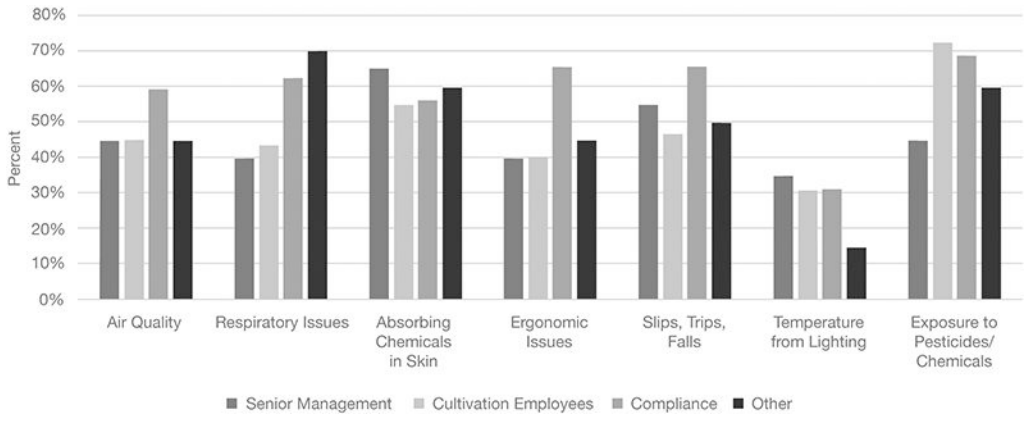

Figure 2:
Pre-training occupational safety and health concerns by job category.