October 2018 Update from the Field: Grain Bin Safety

Qualitative Study on the Control of Hazardous Energy on Machinery Using Lockout and Alternative Methods. Karimi B, Chinniah Y, Burlet-Vienney D, Aucourt B. *Safety Science*. 2018;107:22-34.

In Canada, like many countries, the national standard and provincial regulations require that workers performing maintenance, repair, and un-jamming activities on machinery must follow lockout procedures. However, the high number of accidents linked to hazardous energies and machinery shows that organizations have difficulty with the application of lockout arrangements or use of alternative methods. Therefore, it is important to understand how organizations implement lockout programs and procedures, and the extent to which they are in accordance with relevant standards and regulations. In this qualitative research, the application of lockout and alternative methods was studied in 13 organizations in Quebec, through a group interview, document review and site observation in each organization. In each organization, the researchers conducted a group interview and completed a questionnaire, which included more than a hundred questions on the lockout program, application of lockout procedures, alternative methods, sub-contractor management, training, and audit/inspection. The researchers then used observation data and documentation collected from each organization to verify interviewee responses and to finalize the questionnaire. The shortcomings found included: (i) incomplete lockout programs; (ii) missing steps in general lockout procedures; (iii) not reading the placards; (iv) using alternative methods without risk assessment; (v) poor training for alternative methods; (vi) absence of supervision and coordination of subcontractors; (vii) and lack of audit tools and documentation of audit results. Despite the shortcomings, actual lockout practices in the organizations visited were better than what was described in their lockout programs. Recommendations for addressing identified shortcomings are proposed.

Utilizing Secondary Agricultural Education Programs to Deliver Evidence-Based Grain Safety Training for Young and Beginning Workers. Cheng Y, Field WE, Tormoehlen RL, French BF. *Journal of Agromedicine*. 2017;22(4):328-336.

Purdue University's Agricultural Safety and Health Program (PUASHP) has collaborated with secondary agricultural education programs, including FFA Chapters, for over 70 years to deliver and promote agricultural safety and health programming. With support from a U.S. Department of Labor Susan Harwood Program grant, PUASHP utilized a Developing a Curriculum (DACUM) process to develop, implement, and evaluate an evidence-based curriculum for use with young and beginning workers, ages 16–20, exposed to hazards associated with grain storage and handling. The primary audience was students enrolled in secondary agricultural education programs. A review of the literature identified a gap in educational resources that specifically addresses this target population. The curriculum developed was based on fatality and injury incident data mined from Purdue's Agricultural Confined Space Incident Database and input from a panel of experts. The process identified 27 learning outcomes and finalized a pool of test questions, supported by empirical evidence and confirmed by a panel of experts. An alignment process was then completed with the current national standards for secondary agricultural education programs. Seventy-two youth, ages 16–20, enrolled in secondary-school agricultural education programs, and a smaller group of post-secondary students under the age of 21 interested in working in the grain industry pilot tested the curriculum. Based on student and instructor feedback, the curriculum was refined and submitted to OSHA for approval as part of OSHA's online training resources. The curriculum

was delivered to 3,665 students, ages 16–20. A total of 346 pre- and post-tests were analyzed, and the results used to confirm content validity and assess knowledge gain. Findings led to additional modifications to curriculum content, affirmed knowledge gain, and confirmed appropriateness for use with secondary agricultural education programs. The curriculum has been promoted nationally and made available for free download from www.agconfinedspaces.org. Findings further confirmed the value of delivering safety programming through established programs such as secondary agricultural education programs and FFA Chapters serving youth.

Outcomes Following Traumatic Grain Elevator Injuries. Tolefree S, Truong A, Ward J, Dong F, Ablah E, Haan J. *Journal of Agromedicine*. 2017;22(3):259-263.

Objectives: The absence of a comprehensive database of grain elevator–associated injuries hinders accurate evaluation of injury prevalence and may lead to discordant information about injury frequencies. The main purpose of this study was to identify the most common mechanisms of injury related to grain elevator events. Comparisons of hospital outcomes between patients who sustained traumatic injuries associated with grain elevators at Occupational Safety and Health Administration (OSHA)-regulated industrial sites versus those on OSHA-exempt farming operations were also made. **Methods**: A retrospective review was conducted of all patients' presenting with grain elevator–related injuries at a level-1 trauma center between January 1, 2003, and December 31, 2013. Data collected included demographics, mechanism of injury, injury severity, hospitalization details, and discharge disposition. Data were summarized, and comparisons were made between the groups. **Results**: All patients (N = 18) in the study were male, with a mean age of 37 years. Falls and being caught in equipment each accounted for 27.8% of injuries. Among the 18 patients, there were a total of 37 injuries. The majority of injuries were either lower extremity (29.7%) or chest injuries (21.6%). The average hospital length of stay was 4 ± 4.5 days, and one patient required mechanical ventilation. There were no reported deaths. **Conclusion**: The literature reports entrapments as the leading cause of grain elevator–related injuries; however, this study found that falls and being caught in equipment were the most common mechanisms of injury. This suggests that a greater emphasis should be placed on fall prevention and equipment safety.