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Fall Prevention and Safety Communication Training for Construction Foremen

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As the occupational therapy profession assumes consultative and direct service roles to prevent illness and injury in the workplace and maintain the health of community populations and work groups, it is important to share our experiences from both research and practice. This article describes an occupational safety and health research project led by an occupational therapist researcher in the Midwest and the results of participating for one residential home contractor. Although this project occurred through a research study, the intervention involved educational strategies commonly employed by occupational therapists to prevent injury and maintain work site health.

The construction industry has more deaths than any other industry classification in the U.S. The fatality rate in construction is 9.7/100,000 full time worker equivalents, compared to the fatality rate in all U.S. workers, which is 3.6/100,000 full time equivalents (Center for Construction Research and Training [CPWR], 2013). Falls from heights remain the leading cause of morbidity and mortality in construction workers, consistently accounting for at least one third of the fatalities between 1992 and 2010 (CPWR). In 2010, falls from heights accounted for 64% of the residential construction worker deaths, 100% of the residential framers fatalities, and 20% of construction worker days away from work (U. S. Department of Labor, Bureau of Labor Statistics [BLS], 2011). The injury rate is also high in construction, with 39% more days away from work and 60% longer recovery times than other U.S. industries (CPWR). In a sample of 1,026 apprentice carpenters, we found that apprentices who built homes were twice as likely to experience a fall than apprentices who worked in other areas of construction, such as commercial or industrial, plus half of these apprentices noted that they knew a carpenter who had experienced a workplace fall in the past year (Kaskutas et al., 2009).

Most small residential contractors do not have the resources to provide in-house safety professionals or external safety consultants; therefore safety procedures, training, and equipment are lacking (Hung & Smith-Jackson, 2011). Apprenticeship programs are a common method of preparation in construction; however, only 13.2% of all U.S. construction workers were union members in 2012 (BLS, 2013). Most construction apprenticeship programs are within a union (CPWR, 2013), but apprenticeship training focuses on commercial construction. Residential construction workers are rarely in a union, and they rarely complete an apprenticeship. In addition, in some areas of the country, small residential contractors use temporary workers or day laborers, who do not know the contractor-specific safety policies and work procedures, often due to language barriers.

These workers are often asked to work at heights without requisite knowledge and skills (Kaskutas et al., 2010; Kines et al., 2010; Lipscomb, Dale, Kaskutas, Sherman-Voellinger, & Evanoff, 2008). As a result, unsafe work practices are common in home building (Kaskutas et al., 2009): profit margins are low, the pace is fast, the work environment changes quickly, and government-mandated safety standards are changing. For example, the Occupational Safety and Health Administration announced changes in the residential fall protection requirements just prior to the research described in this manuscript, therefore common work practices, such as walking on a floor joist, are no longer allowed. This has left contractors scurrying to identify methods and purchase fall protection equipment to comply with the new standards. Financial pressures were even more intense during the recent economic recession, which saw a 75% decrease in new home construction (National Association of Realtors, 2012).

The typical residential crew consists of three members led by a working foreman who is in charge of meeting productivity requirements, quality control, scheduling, ordering supplies, reading blueprints, training, supervising workers, and “swinging a hammer.” Foremen are usually promoted through the ranks; they are not required to complete supervisor or leadership training. As a result, crew foremen are expert home builders, but they often lack the teaching and mentoring abilities, communication and feedback skills, and ability to share knowledge to groom a new worker into a safe, productive member of the work crew. One study found that despite possessing greater safety knowledge and more accurate risk perceptions than their crew, construction foremen rarely corrected workers’ unsafe behaviors or provided safety training or mentorship (Hung & Smith-Jackson, 2011). The top skills demonstrated by superior construction mentors included the ability to communicate, share knowledge, and correct mistakes/give negative feedback (Hoffmeister, Cigularov, Sampson, Rosecrance, & Chen, 2011). Safety communication is a strong predictor of workers’ safety behaviors and attitudes (Cigularov, Chen, & Rosecrance, 2010; Conchie, Moon, & Duncan, 2013) and can be improved by training (Kines et al., 2010; Smith, Cigularov, Chen, & Rosecrance, 2008). As young construction workers assume supervisory roles, training needs to be in place to help them learn how to fulfill their multiple responsibilities without sacrificing their safety or that of their crewmembers.

This article reports on the experiences of one residential construction company in the Midwest that participated in a free 8-hour fall prevention and safety communication training for foremen and managers through funded research. This work occurred in a region of the Midwestern United States, where most residential construction workers are in a union. This is uncommon in the construction industry, but the occupational safety and health research team (which included the author, an occupational therapist researcher), had an established relationship with the union. This relationship afforded our team the opportunity to study this rarely researched population of workers. We hypothesized that construction worker safety would improve after the foremen and managers participated in the fall prevention and safety communication training. We hoped to see increased use of fall protection equipment, improved safety knowledge, increased work site safety meetings, and more informal safety communications.

Methods

In order to identify the needs for this fall prevention and safety communication training, we held focus groups (n=48 participants) and administered written surveys (n=409 participants) with carpentry foremen and apprentices. Results of this needs assessment were used by the occupational therapist researcher and two instructors at a carpenters' union apprenticeship program to identify training priorities, specific learner objectives, learning activities, and lesson plans for this 8-hour training, which was pilot tested with 10 participants (Kaskutas, Dale, Lipscomb, & Evanoff, 2013). Soon after pilot testing the intervention, the Occupational Safety and Health Administration enacted stricter fall protection requirements for residential construction, requiring the use of guard rails, safety nets, or a personal fall arrest system (PFAS) at all times. The training was revised based on the pilot testing and the policy change. The participants were a residential contractor, along with 17 foremen and two managers who supervised the foremen.

Training was held at a carpenters' apprenticeship school in both a classroom and shop area. A carpenter trainer from the apprenticeship school with a strong background in fall prevention and recent residential experience as a manager performed most of the training, with the occupational therapist researcher assisting. Training addressed specific methods to protect workers from falls during the home framing process, including installing floor joists and sheathing; wall framing and installation; and installing roof trusses, roof sheathing, windows, doors, and siding (Kaskutas et al., 2013). Prior to the training, a carpenter research assistant visited each foreman's work site twice to administer a short written survey to the foremen and their crewmembers that measured fall prevention knowledge, worksite behaviors, safety climate, and frequency and content of on-the-job training and mentoring via informal discussions and feedback. A standardized observational 62-item dichotomously scored work site audit (Kaskutas, 2011; Kaskutas, Dale, Lipscomb, & Evanoff, 2008) that measures safety when working at heights was also administered. During the training, proper methods to protect workers from falls were contrasted with methods observed at the participating foremen's work sites. Foremen were shown fall prevention technologies and observed this equipment in place on a building prop of a partially constructed home. Participants identified solutions for each stage of the home construction process in small work groups and presented this to the group. Trainers presented methods to deliver informal "toolbox talks" and safety messages. Immediately after the training, the participants rated training effectiveness for four priority areas on a 1- to 10-point scale, with 10 = excellent. In order to assess long-term changes, the occupational therapy researcher re-administered the foreman and crewmember surveys and work site audit at 6, 12, and 24 weeks after the training. Results from 25 worksite audits and 91 surveys were compared using descriptive and nonparametric statistics. Two years after this company participated in the training we performed a structured interview with one of the managers to explore the change process; these results are also reported.

Results

All foremen actively participated in the classroom and shop training, including working in small problem-solving groups. Participants openly shared their attitudes and beliefs; however, they were observably hesitant to role play communication methods or practice during training, with one participant asking, "When did the carpenters become all touchy feely?" The small group problem-solving activity generated much discussion among the members and feedback from the other groups, including problem solving the best way to perform a task and probing regarding why the method shared was chosen. The mean of the effectiveness ratings on the 10-point scale were 7.4 for fall prevention, 7.8 for auditing the work site, 8.3 for communication, and 7.8 for toolbox talks; the overall mean of all areas was 7.85. During the course of post-training visits, the participating company experienced a decrease in new home construction due to the economic recession, which resulted in the layoff of non-supervisory workers and the use of foremen to perform front-line worker duties. As a result, we were not able to gather surveys from as many crewmembers at follow-up as we were able to at baseline since foremen were paired up at work sites due to lack of work. Both foremen and crewmember surveys demonstrated many improvements in safety communication and fall prevention. In reporting pre- and post-training results, we combined results from the two pre-training and the three post-training assessments.

Quantitative Results

Prior to the foremen's training, both the foremen and crewmembers had misconceptions regarding when they could stand on top of a wall while setting roof trusses. This improved to 31 (88%) correct in foremen and 36 (90%) in their crewmembers, suggesting that the participants passed this knowledge along to their crews. The frequency of daily toolbox talks with the crew increased from 13% of the foremen performing these at baseline to 68% after the training. Prior to the training, these training sessions used primarily passive methods of teaching, such as reading aloud a short pre-scripted lesson that was chosen from a standard list of talks. After the training, 83% of the crewmembers reported that these talks focused on hazardous work tasks that the crew was going to be performing that day, compared to 39% before the training. Prior to training, PFAS were not being used at any of the worksites audited, while after the training PFAS was observed in use at one third of the work sites audited (note that it is only required for certain operations). Crewmember-reported availability of fall protection equipment at work sites increased from 56% to 100%. Most importantly, unsafe behaviors decreased greatly, such as walking on the top of walls and joists to secure subsequent sheathing, truss, or roof sheathing in place. It is important to note that the foremen's self-reports were substantiated by their crewmembers' reports, and that these improvements had persisted 6 months after the training date.

Qualitative Results

The manager who was interviewed noted that after the training, the participants met to apply what they had learned. Since many

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of their building practices were not being performed in a safe manner, they investigated many types of equipment and borrowed all of the fall protection equipment that our research group has in an equipment loaning crib at the union. They purchased a body harness for each employee, along with various types of lanyards and anchors for PFAS. The manager noted that the crews "hated it" at first, but over time have become accustomed to more consistent use of fall protection. The company combined some of their previous practices with the new methods that were covered in the training. Regarding safety communication, the manager noted that every foreman performs a toolbox talk at the beginning of the day to discuss hazardous situations and how they will be handled, just as they were trained to do in the intervention. He stated that he personally "preaches all the time" to the workers, noting that "people get lax and need refreshers." He said that the training led to decreased risks to the workers and they have not had any falls. The company manager added that their workers' compensation insurance company did a detailed audit of their records and policies, and audited every work site, and as a result of the changes in fall prevention their insurance rates decreased substantially.

Discussion

We have presented a case example of a residential construction company that demonstrated improved worker safety due to participation in a research-based educational intervention that combined fall prevention and safety communication. Participating managers championed changes in fall protection methods on a company-wide basis. Although the pre–post design cannot account for confounding temporal variables, the initial study design of wait-listing foremen as a control group was not possible as the economic recession led to a decrease in the pool of participants. Since foremen-reported behavior changes were corroborated by reports of their crewmembers and work-site audits, we are confident that improvements did occur as a result of the training intervention. The fact that the company's workers' compensation insurance reduced their premiums after the intervention due to major improvements in work site safety corroborates this finding.

Providing interventions to managers who can lead their workers is an intervention method that should be considered in work injury prevention programs, as the training effects are multiplied through dissemination to others. Use of small group problem-solving exercises was an effective method of training, but role plays were not received well by this construction worker population. The occupational therapist researcher who assisted in designing the training is accustomed to teaching occupational therapy students, who are primarily young females pursuing a profession that relies on social skills, whereas the construction worker population involved in this training were middle-aged males who have spent their careers in a profession that relies on tools and building skills, versus communication skills. The inclusion of safety communication training that shows front-line supervisors how to deliver worker training and provide regular feedback to shape worker behaviors will help the managers deliver these safety messages effectively to their workers. This is especially important in small companies that do not have the resources to employ safety professionals. As prevention becomes a mainstream role for occupational therapy professionals in work and industry, it is important to demonstrate that the interventions we are designing are effective. Because occupational therapy professionals understand the learning process and have experience teaching individual patients and leading groups, we have the inherent skills to perform this type of training. Using training methods that match the learners' preferences will most likely result in improved attention during the training and long-term retention. Post-training measures are important to evaluate impressions of the training; long-term measurement should also be performed to understand sustainability of the results. Targeting occupations with high injury rates can help decrease morbidity and mortality, whether it is part of a research, clinical, or employer-based intervention.

For an overview of the training used in this project and pilot testing results, see Kaskutas et al. (2013).

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References

Center for Construction Research and Training. (2013). *The construction chart book: The U.S. construction industry and its workers* (5th ed.). Retrieved from http://www.cpwr.com/publications/construction-chart-book

Cigularov, K. P., Chen, P. Y., & Rosecrance, J. (2010). The effects of error management climate and safety communication on safety: A multi-level study. *Accident Analysis & Prevention, 42*, 1498–1506.

Conchie, S. M., Moon, S., & Duncan, M. (2013). Supervisors' engagement in safety leadership: Factors that help and hinder. *Safety Science, 51*, 109–117.

Hoffmeister, K., Cigularov, K. P., Sampson, J., Rosecrance, J. C., & Chen, P. Y. (2011). A perspective on effective mentoring in the construction industry. *Leadership & Organization Development Journal, 32*, 673–688.

Hung, Y., & Smith-Jackson, T. (2011). Use of attitude congruence to identify safety interventions for small residential builders. *Construction Management and Economics, 29*, 113–130.

Kaskutas, V. (2011). *St. Louis Audit of Fall Risks* (Rev.). St. Louis, MO: Washington University. Retrieved from http://www.elcosh.org/document/3677/d001218/St%2BLouis%2BAudit%2Bof%2BFall%2BRisks%252C%2BJuly%2B2011%2BRevision.html

Kaskutas, V., Dale, A. M., Lipscomb, H., & Evanoff, B. (2008). Development of the St. Louis audit of fall risks at residential construction sites. *International Journal of Occupational and Environmental Health, 14*, 243–249.

Kaskutas, V., Dale, A. M., Lipscomb, H., & Evanoff, B. (2013). Fall prevention and safety communication training for foremen: Report of a pilot project designed to improve residential construction safety. *Journal of Safety Research, 44*, 111–118.

Kaskutas, V., Dale A. M., Lipscomb, H., Gaal, J., Fuchs, M., & Evanoff, B. (2010). Fall prevention in apprentice carpenters. *Scandinavian Journal of Work Environment & Health, 36*, 258–265.

Kaskutas, V., Dale, A. M., Nolan, J., Patterson, D., Lipscomb, H. J., & Evanoff, B. (2009). Fall hazard control observed on residential construction sites. *American Journal of Industrial Medicine, 52*, 491–499.

Kines, P., Andersen, L. P. S., Spangenberg, S., Mikkelsen, K. L., Dyreborg, J., & Zohar, D. (2010). Improving construction site safety through leader-based verbal safety communication. *Journal of Safety Research, 41*, 399–406.

Lipscomb, H. J., Dale, A. M., Kaskutas, V., Sherman-Voellinger, R., & Evanoff, B. (2008). Challenges in residential fall prevention: Insight from apprentice carpenters. *American Journal of Industrial Medicine, 51*, 60–68.

National Association of Realtors. (2012). NAR economic forecast. Retrieved from http://www.realtor.org/sites/default/files/reports/2012/Economic-Forecast-2012-03-26.pdf

Smith, A., Cigularov, K., Chen, P., & Rosecrance, J. (2008). Project safe talk: Safety communication training for construction workers. Paper presented at NORA Symposium, Denver, CO.

U.S. Department of Labor, Bureau of Labor Statistics. (2011). Injuries, illness and fatalities. *IIF Databases.* Retrieved from http://www.bls.gov/iif/data.htm

U.S. Department of Labor, Bureau of Labor Statistics. (2013). Union members – 2012. Retrieved from http://www.bls.gov/news.release/pdf/union2.pdf

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