

Introduction Employee safety incentive programs are a form of communicating to engage employees to increase the use of safety controls ranging from the use of proper tools, pre-task planning, to the use of personal protective equipment. We developed a safety communication and recognition program designed to encourage improvement of physical working conditions and hazard reduction in construction. The program communicated how well both the work site and individual subcontractors were controlling hazards on the site.

Methods To evaluate the developed program, we completed a cluster randomised controlled trial on eight worksites for approximately five months per site. Pre- and post- worker surveys measured changes in safety climate (n=615 with follow up rate of 88%). Multi-level mixed effect regression models tested the effect of B-SAFE on safety climate as assessed from surveys. Focus groups (n=6–8 workers/site) provided qualitative measures of changes not measured via the surveys.

Result Safety climate score at intervention sites improved. The intervention effect size was 1.64 (3.28%) (P-value=0.01) when adjusted for month the worker started on-site, total length of time on-site, as well as individual characteristics (trade, title, age, and race/ethnicity). At intervention sites, workers noted increased levels of safety awareness, communication, and teamwork compared to control sites. Managers noted that subcontractors worked together and workers were engaged in the communication and receiving the data.

Discussion The program led to many positive changes, including an improvement in safety climate, awareness, teambuilding, and communication. The program is a simple approach to engaged workers through effective communication infrastructures and had a significant, positive effect on worksite safety

1597c SHARING SOLUTIONS IN PARTICIPATORY ERGONOMICS – A KEY TO SUSTAINABILITY

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10.1136/oemed-2018-ICOHabstracts.236

Introduction Musculoskeletal disorders (MSD) and slips, trips, and falls (STF) are a major source of workplace injuries. In Ontario, MSD account for upwards of 40% and STF account for almost 20% of all lost-time claims depending on sector. Our objective was to integrate stakeholder perspectives about the implementation of a participatory ergonomics program.

Methods The project builds on a recently completed pilot study and process evaluation of the Employee Participation in Change (EPIC) program in three work sites (391 workers) within one organisation. Individual interviews were conducted with Program Champions (n=3) and an interactive stakeholder workshop, including a moderated focus group (n=13), was held. Data from Program Champions informed the interactive workshop. Focus group data centred on strategies for knowledge sharing and program recommendations. Transcripts and field notes were analysed for emerging themes.

Results Participants reported positive experiences with program implementation. EPIC has been sustained and incorporated into existing health and safety procedures at all sites. Improvements in communication about safety were noted in all cases. Funding to implement changes remains a challenge in all sites.

Program champions, site administrators and worker representatives led discussions consistently noted positive changes

but also described the need for iteration in solution development. Focus group results included suggestions to reduce program training and paperwork burdens. Key barriers included the time it takes to implement solutions.

Frontline workers continue to use EPIC hazard identification tools and practices, and communicate about hazards and solutions regularly. The 'raised awareness' from EPIC has persisted. A key facilitator to success included the role of ergonomics consultants.

Conclusion EPIC program stakeholders participated in an interactive workshop to inform improvements in program delivery and evaluation of a participatory intervention. Participants noted that sharing solutions across sites would have been useful earlier. Future implementation research will incorporate solution sharing opportunities.

1597d PARTICIPATORY ERGONOMIC PROGRAMS IN COMMERCIAL CONSTRUCTION PROJECTS: ENGAGEMENT WITH MULTIPLE ORGANISATIONAL LEVELS TO IMPROVE EFFECTIVENESS

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10.1136/oemed-2018-ICOHabstracts.237

Introduction Effective participatory ergonomic programs require cooperative engagement of management and workers to identify hazardous tasks and implement useful solutions. We report findings from participatory programs within seven single employers on different multi-employer construction projects.

Methods We trained all employees in ergonomic principles, hazard recognition, and use of a participatory approach to identify and implement feasible solutions. We measured program delivery and effectiveness through training records, number of identified hazardous tasks and solutions, and number of employer-controlled and worker-controlled solutions implemented over a three-month period.

Result Most (91%) of the 95 workers were trained; participating workers identified 105 hazardous tasks. Equipment solutions for 43 of these tasks were the responsibility of the employer; workers were responsible for 44 tool and 8 work practice solutions. Ten hazardous tasks without solutions related to the construction environment and/or schedule that were controlled by the primary contractor. Relatively few employer-controlled equipment solutions (33%) were implemented during the project while 75% of the worker-controlled tool solutions were implemented.

Discussion These results highlight two barriers to implementing effective solutions in single employer participatory ergonomic programs:

- employers do not involve workers in selecting useful equipment for projects, and
- primary contractors control the project schedule and environment.

The complex organisation of multi-employer sites and frequently changing work tasks and environments may account for the varied effectiveness of participatory ergonomic programs in construction. Most programs have engaged workers within single employers, rather than being integrated within

the overall construction management processes overseen by a primary contractor. A new study is underway that integrates ergonomic training, planning, and oversight within the primary contractor's safety programs, and encourages planning to reduce ergonomic hazards during the preconstruction phase.

1597e PARTICIPATORY PROJECTS TO IMPROVE THE USE OF ERGONOMIC MEASURES

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10.1136/oemed-2018-ICOHabstracts.238

Introduction Ergonomic measures are available to reduce high physical work demands among construction workers. Providing construction workers with information of risk factors alone will not be effective in increasing the use of ergonomic measures due to the complex working environment, the involvement of many different stakeholders and the conservative nature of the construction industry. Our aim was to study the process of face-to-face (F2F) and e-guidance (EG) strategies of participatory ergonomics (PE) company projects on the implementation of ergonomic measures to prevent musculoskeletal disorders.

Methods The implementation process was evaluated alongside a cluster randomised parallel intervention trial with a follow-up at six months regarding the effect of two PE guidance strategies on the use of ergonomic measures. The design of the study was described in Visser, *et al.* (2014). Ergonomic consultants guided six companies through face-to-face contact in F2F and six through email contact in EG. Whether the intervention was delivered as planned was evaluated by the process evaluation components dose delivered and dose received as described by Linnan and Steckler (2002). In addition, satisfaction and behavioural change among construction workers were evaluated.

Result Implementation activities delivered (F2F: 63%; EG: 44%) and received (F2F: 42%; EG 16%) in companies were low. The satisfaction with the PE strategies was strongly affected by the actual activities in the companies. For behavioural change, knowledge regarding risk factors and ergonomic measures (+14%; F2F) and culture regarding the norms, values and expectations of the company regarding working with ergonomic measures (+26%; EG) among workers increased.

Discussion This study showed that compliance to a face-to-face and an e-guidance strategy is low. To improve the compliance, it is advised to start with a face-to-face meeting with all stakeholders to see which parts of the intervention are needed and which guidance strategy can be used for these parts.

1594 VISION ZERO IN CONSTRUCTION

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10.1136/oemed-2018-ICOHabstracts.239

Aim of special session To introduce *Vision Zero*, as developed by the International Social Security Association (ISSA) for the construction industry, and to describe its application and impact in developed and developing economies.

Presenters ¹Prof. Karl-Heinz Noetel, ²Mr. Paul Duphil, ³Dr. K.N. Sen, ⁴Mr. Jean Claude Poirier, ⁵Dr. Knut Ringen

1594a VISION ZERO IN CONSTRUCTION: SUSTAINABLE WORK AND SUSTAINABLE DEVELOPMENT

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10.1136/oemed-2018-ICOHabstracts.240

Today factors like international competition, the demographic change, the proceeding structural change and the growing density of information determine everyone's lives. At the same time, due to these factors the economy, the society as well as organisations dealing with OSH like the International Social Security Association are facing major challenges worldwide in the field of the prevention of occupational diseases and injuries

Considering health as being the highest good of man, the primary focus should be on maintaining human health by all possible means. A reliable method for maintaining human health is to invest in the prevention of health hazards. At the same time investing in prevention helps to avoid much higher costs caused by occupational accidents, occupational diseases, and lost working time, and can also be regarded as a key competitive factor. Thus, prevention contributes to sustainable economic success of the companies as well as the preservation of employability of people.

The fatality rate in the field of construction is still higher than that in other industries. With its prevention strategy 'Vision Zero' ISSA Construction – by using appropriate preventive measures – seeks to create a working environment where no individual is injured or killed at work nor suffers from serious injuries or occupational diseases. To achieve this, ISSA Construction sets seven Golden Rules and describes measures which contribute to meeting the named objectives. ISSA Construction already works together with ISSA Mining to achieve these objectives. The future ambitions to work together with all other ISSA sections on 'Vision Zero', thus paving the way to work together worldwide and across all sectors on a work environment with zero risk to get injured at work.

The Seven Golden Rules for 'Vision Zero' are the following:

Rule 1: Take leadership commitment by setting safety always as the number one priority on every agenda, by serving as a model for OSH matters, by reacting instantly to unsafe conditions and behaviour.

Rule 2: Identify hazards and risks by a systematic risk assessment, including maintenance and repairs, evaluating work accidents, diseases and near misses.

Rule 3: Set targets for safety by defining your own OSH targets, evaluating progress and adapt them if necessary, designing prevention campaigns.

Rule 4: Ensure a safe system by increasing the responsibility of all managers, implementing a safety management system.

Rule 5: Use safe and healthy technology by taking account of OSH when ordering new machinery or plant, using all machines in a safe way and checking safety installations regularly, providing safe access and egress.

Rule 6: Improve qualification by educating – because competence needs education –, by defining the required qualification for each workplace, and by setting up a plan for training and instruction.

Rule 7: Invest in people by involving your employees, using your employee's ideas about how to safety, acknowledging good safety performance, developing confidence and a culture of prevention.