

# Motivational Methods to Increase In-Field Use of Personal Protective Equipment

(산업현장에서의 재해예방용 안전기구사용증대를 위한 방법)

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## ABSTRACT

Numerous motivational methodologies were analyzed with respect to improvement of the use of personal protective equipment (PPE) in the industrial field. Common industrial protective devices under consideration included hearing protection devices, respiratory protection devices, eye and face protection devices, etc. It was found that several of such methods could readily be implemented in the real world to protect workers from hazardous industrial stressors, such as intense noises, toxic air contaminants, and other dangerous industrial objects (e.g., chemicals). Current research issues and recommendations for future research are addressed.

## INTRODUCTION

### Hazard Control Measures

Every year, industrial workers are victimized by various hazards in the workplace. Typically, there are three methods of controlling occupational hazards : engineering controls, administrative controls, and personal protective equipment (PPE).

Engineering controls are certain passive measures to prevent contact with potential hazards, such as changing process design, placing barriers or guards, isolating or enclosing hazards, etc. Administrative controls are ways to manage conditions so that workers' exposure is controlled or reduced. Examples include worker rotation to minimize exposure and devising appropriate worker training. PPE refers to the use of specialized personal safeguarding devices, including hearing protection devices (HPDs), safety glasses, respirators, hard hats, special clothing, or any devices whose proper use can reduce personal injuries or illness from occupational hazards (e.g., high industrial noise, metal chips, sparks, toxic air contaminants and gases, flying objects, chemicals, and so on). For detailed discussion of several types of PPE and their proper use, the reader refers to National Safety Council (1992). Out of these three control measures, engineering controls are the most desirable method, followed by administrative controls.

Although the least desirable method of controlling workplace hazards, PPE is currently the most practical and common way to protect industrial workers from hazards in industrial environments. However, use of PPE is only effective when those protective devices are properly used. If they are not used on a regular basis, misused, abused, or improperly handled by users (unfortunately, these are common phenomena in the workplace), a serious under-protection may result. This paper suggests several effective ways to improve the proper use of PPE in the field using behavioral analysis/intervention strategies.

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## Applied Behavioral Analysis and Occupational Safety

Applied behavioral analysis is based on the approach to behavioral science developed by Skinner (cited in Geller, 1989), emphasizing the importance of overt behaviors and their observable environmental, social, and physiological determinants (Geller, 1989). Thus, implementing behavioral analysis/intervention strategies requires definition of specific target behaviors and identification of contingencies that support such behaviors.

The rationale for applying behavioral analysis to occupational safety is to prevent safety hazards before they occur by providing management and safety personnel with preventive thinking and decision making. As "Heinrich's Law" (Heinrich, Peterson, and Roos, 1980) verifies the fact that numerous unsafe incidents occur which are not investigated (often termed "near misses") and thus do not lead to corrective actions, much of the work time of corporate safety engineers is occupied by reactive actions, rather than proactive (or preventive) decision making. If those near misses were evaluated, corrective actions could be implemented before a similar incident results in an injury or even fatality. It is to this end that corporate safety programs promote preventive thinking and action via applied behavioral analysis/intervention strategies.

### **BEHAVIORAL ANALYSIS/INTERVENTION STRATEGIES FOR PPE USE**

Intervention strategies can be designed according to the antecedent(A)-behavior(B)-consequence(C) model, or ABC model, which is a conceptual approach toward behavior change focusing on "behavioral antecedents and consequences" that *increase* the occurrence of *desired behaviors* and *decrease* the occurrence of *undesired behaviors* (Geller, 1989). A conceptual ABC model for PPE use is illustrated in Figure 1. The current discussion of intervention strategies for PPE use will be done under these two categories: antecedents and consequences.

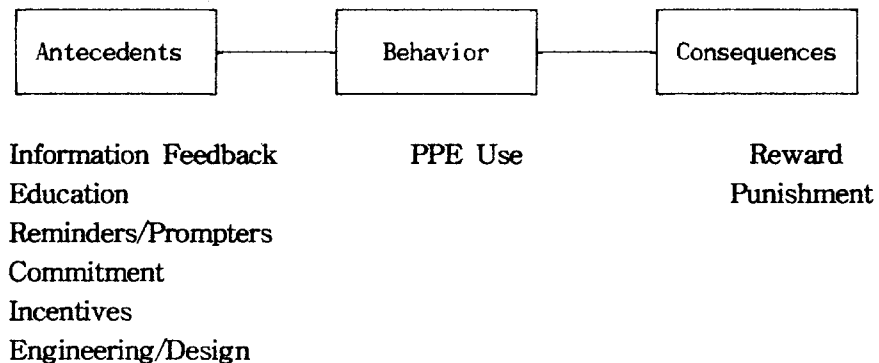


Figure 1. An "ABC" model for motivating the use of personal protective equipment.

#### Motivating Behavior with Antecedents: Antecedent Strategies

One way to motivate PPE use in the workplace is to present cues or reminders, called "antecedents" because they occur before the response is made. Potential intervention strategies which may be applied to improving PPE include (1) information feedback; (2) education; (3) reminders/prompters; (4) commitment; (5) incentives; and (6) engineering/design strategies.

Information Feedback. A very successful behavioral modification study utilizing employee audiograms was conducted by Zohar, Cohen, and Azar (1980). Workers in a noisy metal fabrication plant took hearing tests before and at the end of their workshifts to ascertain the extent of temporary hearing losses, called temporary threshold shifts (TTS), that occurred with and without HPDs (i.e., earplugs) being worn. Audiometric results were discussed with the workers immediately after the second test, the audiometric data were also posted on the department bulletin board. Thus, the information was fed back to individual workers as a means for motivating greater use of ear protectors issued for hearing conservation purposes. That is, feeding back TTS information to individual workers who wear and do not wear HPDs in a known workplace can point out the benefits of such protection and provide a strong incentive to their increased use of HPDs.

Although the feedback lasted only one month, five months of follow-up observations indicated that the information feedback successfully modified worker behavior and continued working after cessation of the treatments. The improved performance was attributed to a permanent modification of the work environment, so that HPD usage emerged as a behavior that was continually reinforced by peer pressure and supervisor expectations. The program became a self-sustaining activity.

Education. Educational activities are activators which can certainly influence behavior change. Employee training and education have gained significant support in recent years both from a regulatory perspective and from management (Stapleton and Royster, 1985). For example, the U.S. OSHA (Occupational Safety and Health Administration) standards have increasingly employed education as a necessary means of achieving compliance.

Before attempting to change behavior via education, it is important to offer potential participants (i.e., employees) a sound rationale for the behavior-change program (Geller, 1989). This will help them accept those attempts to motivate behavior change and increase the probability that the person will develop an intrinsic justification for the desired behavior and continue this behavior in the absence of the extrinsic motivators (e.g., rewards and punishments). Research has indicated (e.g., Geller and Hahn, 1984) that education directed toward behavior change is more effective in small (e.g., 10-15 people) rather than large groups, and that it should include interactive demonstrations and discussion rather than lecturing (or showing films) to a passive audience.

Reminders/Prompters. This approach can be accomplished by presenting slogans and instructions in the form of posters, signs, stickers, and educational pamphlets which urge PPE use. Although the reminders/prompters strategies are simple, easy to implement, and able to produce prominent positive effects, when these slogans and instruction posters are removed, PPE usage may drop significantly (Williams, Thyer, Bailey, and Harrison, 1989).

Commitment. Commitment strategies involve a verbal or written statement (e.g., signing a pledge) from individuals or groups that specifies a particular response or set of responses to emit (e.g., remove bad PPE), or to stop (e.g., stop abusing PPE). This commitment strategy (e.g., using a pledge card) may considerably promote the use of PPE with relatively cheap cost in the workplace; however, the workers often need to be reminded and monitored. Otherwise, the strategy will be short-lived.

Engineering/Design strategies. Engineering and/or design antecedents for personal protection involve the design or redesign of devices, i.e., design and material changes in the PPE to improve their comfort or environments to facilitate the occurrence of personal protection by increasing behavioral convenience. This approach may cost more, in a relative sense, than other viable intervention strategies. However, it provides an excellent input for promoting one's behavioral change (e.g., from non-wearing PPE to wearing PPE properly).

Incentives. Announcing with verbal or written instruction that rewards will be given to individuals who are observed wearing their PPE is termed an "incentive." An example may be running an advertisement in the company bulletin which announces that supervisors will be recording the names of workers with PPE on, which will be used as lottery tickets for weekly raffle drawings.

This promotional aspect of the program is an incentive, whereas delivering actual prizes to raffle winners is a rewarding consequence, contingent upon a name being selected during weekly raffles. This incentive strategy may usually result in very positive effects on workers' behavior change, along with rewarding consequences which will be discussed next.

#### Motivating Behavior with Consequences: Consequence Strategies

Research has demonstrated that using cues or reminders is usually not sufficient to motivate many individuals to change behavior (i.e., wearing PPE). Thus, it is necessary to add "consequences" (e.g., rewards or punishments) following behaviors (Geller, 1985). Since the punitive strategies (i.e., punishments) may not be preferable due to unwanted behavioral side effects, only reward strategies (or rewarding consequences) are discussed here.

Reward strategies. As indicated before out of two possible choices of consequence strategies, reward strategies are preferable. However, it is not necessary to reward every occurrence of PPE wearing. In fact, behavioral scientists have observed a critical advantage of rewarding "some" (intermittent) rather than "all" occurrences of the desired behavior (Geller, 1985; Zohar, 1980). The use of intermittent rewards increases the probability that the desired behavior will continue when rewards are no longer available, as corroborated by Zohar (1980). This is a special advantage of using reward rather than punishment strategies. That is, if the probability of receiving a consequence (reward or punishment) is relatively low, workers are usually influenced more by a slight possibility of winning a reward for wearing PPE than by a slight possibility of receiving punishment for noncompliance. It has been recommended that inexpensive items (e.g., drink coupons, coffee mugs, tokens, baseball caps) be used for intermittent rewarding to recognize the safe performance of individual workers. For instance, according to the token economy system implemented by Zohar (1980), after workers received tokens for hearing protector wearing, they could use the tokens to acquire a variety of inexpensive consumer products, where each product had a price in terms of the number of tokens required for purchase. It is also desirable to select individual employees (or teams of employees) for the receipt of safety awards.

## CONCLUSION

From the aforementioned discussion, it can be concluded that several existing intervention strategies are cost-effective for increasing PPE use, but no single approach is sufficient. While the laboratory data may suggest one particular approach over another, the real-world situation may require that another technique be applied. Therefore, it is imperative for the program task force to understand what conditions are required for a particular intervention strategy and then to determine whether that strategy can be applied in a given environment. More research is warranted for selecting an optimal motivational method applicable to a specific industrial workplace.

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