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Combined peer-to-peer feedback and continuous improvement associated with reduced injuries at Amtrak-Chicago

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ABSTRACT

The Federal Railroad Administration (FRA) Human Factors Research and Development (R&D) Program sponsored a Clear Signal for Action (CSA) demonstration pilot to evaluate whether an approach that combines peer-to-peer feedback and continuous improvement methods can improve safety in the railroad industry, as it has in other industries. The Station Services Department, comprised of baggage handlers and other workers represented by the Transportation Communication Union (TCU) at Chicago's Amtrak Union Station, participated in the demonstration pilot. CSA was implemented by Behavioral Science Technology, Inc. (BST) over sixteen months (Phase 1) and seventeen more months (Phase 2), separated by a fourteen-month withdrawal due to downsizing. An independent evaluation of the project, conducted at the Volpe National Transportation Systems Center, found the injury rate significantly decreased following employee training in Phase 2 on CSA methods. In both phases, the injury rate decreased significantly as the total number of peer-to-peer feedback sessions accumulated. The injury rate did not change during baseline or withdrawal. Interviews with Station Services employees suggested that, as a result of the greater employee involvement in safety, employees experienced an increased personal safety awareness and communication about safety.

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1. Introduction

1.1. Background

Peer-to-peer feedback safety methods (PPF) use behavioral analysis methods to identify and address at-risk behaviors before they cause injuries (Wirth and Sigurdsson, 2008) by using worker-to-worker observations of, and feedback about, work behavior, conditions, and organizational factors. This can potentially improve both safety and safety culture (Williams and Geller, 2000; Sulzer-Azaroff and Austin, 2000; Guastello, 1993; Kopelman, 1986). Within the railroad industry, Ricci (2003) found a 17% increase in the prevalence of safe behavior and a 57% reduction in injury frequency in an implementation of peer-to-peer feedback at a major freight carrier. The feedback in that implementation occurred in a workshop after the observations were conducted. Theoretically, immediate peer-to-peer feedback, as done in other industries (e.g., Williams and Geller, 2000), could increase the impact even further.

Unfortunately, traditional PPF approaches (Wirth and Sigurdsson, 2008) discussed in the literature often place too little emphasis on the influence that upstream managers, systems, and practices have on at-risk behavior and conditions. As a result, several unions have given PPF negative reviews (Spigener and Hodson, 1997; Howe, 1999, 2001). Thus, comprehensive approaches have added components such as continuous improvement (CI) (Deming, 2000; Walton, 1986). Continuous improvement (CI) analyzes observation data for corrective actions to be implemented to address identified barriers to safety. There is little literature on the effectiveness of CI alone on safety, but indirect evidence comes from the meta-analysis of Guastello (1993), which reveal injury reductions for a number of interventions that resemble CI activities. Perhaps as significant as the potential benefits of CI in isolation, a combination of PPF and CI creates a process fostering strong labor-management cooperation on safety. PPF and CI work together to address both risks within the control of the worker and risks associated with systemic issues that only management can correct resulting in both labor and management having responsibilities for improving safety.

One approach that combines PPF and CI as a method of safety improvement in the U.S. railroad industry is the Federal Railroad Administration's (FRA) Clear Signal for Action (CSA). Over nine

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years, FRA sponsored three multi-year CSA demonstration pilots of CSA (Ranney et al., 2013). Behavioral Science Technology, Inc. (BST) actively designed, instructed, and advised on implementation of each demonstration pilot. FRA also sponsored the Volpe National Transportation Systems Center (Volpe Center) authors to rigorously and independently evaluate each demonstration pilot. The three evaluations constitute a strategy to assess CSA's effectiveness across the entire industry by evaluating demonstration pilots at three railroad sites with distinctly different work-coordination settings (Coplen, 2012): (1) nondispersed, or in-facility (e.g., material movement, mechanical); (2) semidispersed (e.g., switching-yard crews, track-engineering gangs) (Coplen and Ranney, 2009; Coplen et al., 2008a; Wu et al., in press); and (3) dispersed workers (e.g., road crews) (Zuschlag et al., 2016; Zuschlag et al., 2012; Coplen et al., 2009a, 2009b, 2008a, 2007b; Ranney et al., 2009). "Dispersed," in this context, means that workers in similar job categories are not co-located, with each other or with their supervisor, when working; they are spread out, as in the case of locomotive engineers and power-line-repair workers.

A previously published work evaluated the impacts of two demonstration pilots of CSA at Union Pacific. The first demonstration pilot featured dispersed workers (Zuschlag et al., 2016; Zuschlag et al., 2012; Coplen et al., 2009a, 2009b) and the second featured semi-dispersed workers (Coplen and Ranney, 2009; Coplen et al., 2008a; Wu et al., in press). Evaluation of the first demonstration pilot found improvements in safety performance and labor-management relations associated with CSA, while evaluation of the second demonstration pilot found quantitative improvements in safety performance but no quantitative changes in safety culture. This article summarizes the evaluation of a demonstration pilot that preceded the Union Pacific demonstration pilots. This precursor demonstration pilot was at an Amtrak site with a nondispersed work setting (for earlier versions of this study, see Ranney et al. (2005) and Coplen et al. (2007a)). FRA conducted the Amtrak demonstration pilot in a nondispersed work setting before trying dispersed or nondispersed work settings because it was thought it might be easiest to implement CSA when management was routinely around. In addition to the difference in work coordination, this Amtrak demonstration pilot differed from the subsequent Union Pacific demonstration pilots on the following:

- *Type of work.* The Amtrak demonstration pilot concerned primarily baggage handling for a passenger railroad, while the Union Pacific demonstration pilots concerned road and switching work for a freight railroad.
- *Safety outcome.* Because of the nature of the type of work, the evaluation of the Amtrak demonstration pilot focused on the impact on worker injuries. In contrast, evaluation of the Union Pacific demonstration pilots focused on the impact on engineer decertifications and yard derailments.
- *Safety leadership training.* The Union Pacific demonstration pilots included safety leadership training (Krause et al., 1999) for management. Safety leadership training was added to CSA after the Amtrak demonstration pilot. Thus, the demonstration pilot reported here did not have the potential benefits of such training.

This implementation at Amtrak thus provides a test of the generalizability of the CSA method to different work-coordination settings, work type, and safety concerns encountered in the railroad industry. It also provides an opportunity to assess the potential importance of safety leadership training.

1.2. Description of the clear signal for action method

As depicted in the upper-left corner of Fig. 1, management must make an initial commitment to the CSA method and provide the necessary resources. This follows from literature on organizational performance that identifies managers as responsible for developing the organization's safety culture (Simard and Marchand, 1994, 1997; Deming, 2000), which is the organization's values, attitudes, competencies, and patterns of behaviors related to safety (Reason, 1997). By committing to a new safety initiative, management makes the first step toward improving the safety culture by providing employees and managers an opportunity to develop new attitudes, competencies, and patterns of behavior.

Management, in collaboration with workers, union representatives, and, in this case, an external consultant, selects a *steering committee,* comprising mostly workers and a few managers who oversee the most important steps in the implementation process. Employee involvement is thought to be essential in generating buy-in and ensuring that the reform is self-sustaining (DePasquale and Geller, 1999).

PPF uses a site-specific "checklist of critical safe behavior and conditions," developed by examining past injury reports to identify common behavior and conditions leading to injuries (Komaki et al., 1978; Krause, 1997), a method that is still used today (Coplen and Cantu, 2015). For each element of behavior or condition, the checklist includes observable and mutually exclusive safe and at-risk forms of the behavior or condition. For example, for boarding a railroad car, the safe form is to grasp the handrail or other handhold as one steps aboard, while the at-risk form is to step aboard without using hands to secure oneself for a possible sudden car movement. Thus, for every at-risk behavior and condition on the checklist, there is a converse safe behavior and condition.

With the checklist developed, employees are trained in how to confidentially *identify and record* behaviors/conditions covered in the checklist (both safe and at-risk) while observing their peers, how to *deliver feedback* in a positive manner, and how to *interview* the person observed to identify barriers to safe practices[1] (see Fig. 1). By encouraging safe behavior and discouraging at-risk behavior, the observer motivates the peer to change behaviors so that they reduce the rate of safety incidents, such as personal injuries. A key assumption is that peer feedback is less threatening than supervisor feedback, so employees will be more likely to accept and respond to feedback from peers than from supervisors. In theory, employees accept peer feedback more than supervisor feedback because employees fear their peers less than their supervisor, whose duties can include employee performance evaluation and discipline (Alvero et al., 2008). In effect, employees within an organization tend to have a better safety culture among themselves than that between employees and managers because the employees trust each other more than their managers, and trust is key to an effective safety culture (Reason, 2003). CSA has been successful in industries ranging from the chemical industry to transportation in large part because trust is relatively high among workers (Krause et al., 1999).

To conduct CI, the steering committee inputs data from the feedback sessions into a confidential and secure electronic database. The steering committee then periodically analyzes the feedback session data to identify high-risk behaviors and conditions. Both management and the steering committee develop and implement corrective actions although the two groups focus on different improvements. The steering committee analyzes trends identifying barriers to safety and implements corrective actions under its control. If a given high-risk behavior or condition can be addressed by continued peer-to-peer feedback, then the steering committee is responsible for doing so. However, if the high-risk behavior or condition needs a system improvement, such as training or procedure changes, management must execute the corrective action (see the

[1] Previous studies indicate that training by itself has a positive impact on organizational productivity whether or not those trained actually put the new skills into practice (Kopelman, 1986).

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