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Designing Effective Safety Interventions

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Introduction

This article explores concepts within the field of safety management perceived to make safety interventions more effective. Distinctions are made between soft fix interventions and hard fix interventions with suggestions and examples for successful design and execution of each kind. The final point provides strategies for making intervention recommendations.

Simple Distinctions about Safety Interventions

From Miriam-Webster, one of several definitions of intervene is "to interfere with the outcome or course especially of a condition or process (as to prevent harm or improve functioning)." Stolovitch & Keeps (p. 110 - 117) provide a practical definition of intervention "Simply stated, an intervention is something that is specifically designed to bridge the gap between current and desired performance states. It can be complete unto itself or part of a basket of interventions. It is a deliberately conceived act or system that is strategically applied to produce intended performance results." They separate interventions into two categories, (1) Learning Interventions that involve alterations in mental structures or behavioral change and (2) Non-Learning Interventions which are actions or events designed to change conditions that facilitate attainment of performance.

A simple definition of a safety intervention from the CDC *Guide to Evaluating the Effectiveness of Strategies for Preventing Work Injuries,* is "An attempt to change how things are done in order to improve safety performance." It could be a new program, practice, or initiative to improve safety.

In the practice of safety management there are countless ways to intervene. Perhaps intuitively, and from experience or research, we know that some interventions are more effective than others. Safety professionals who are adept at identifying the kinds of interventions most likely to have an impact on safety performance can add value to their organizations. Understanding what makes safety interventions effective not only benefits the organization, it can help the professional advance his/her career.

In the hierarchy of safety controls, interventions can be classified as either ameliorating or contingent (Manuele, chapter 12). Substitution, elimination, and engineering controls are interventions that generally ameliorate the hazardous condition and are preferable over contingent controls whenever feasible. Amelioration falls under the Non-Learning Intervention classification. Administrative controls, training, and personal protective equipment are contingent interventions that fall under the Learning Intervention category. Since these interventions are contingent on compliant behavior they are lower in the hierarchy and typically less desirable for long-range optimal safety performance.

Safety interventions may focus on addressing proximal causes (situated close to) of injuries or conversely identify distal causation factors (situated away from the point of injury) for intervention. Proximal causes of injury, such as the behavior that immediately preceded the injury are typically symptoms of a deeper issue, whereas distal causes are often in the category of primary or root causes. Although distal causes are generally more important to address in interventions, they are often less apparent because they tend to be buried in the management system or reinforced by the unwritten organizational culture.

How effective is it to focus on proximal interventions versus distal interventions? In general focusing on proximal causes tends to be easier to do, less permanent, and less far reaching in effect. Focusing on distal causes of injuries is often more difficult to do, yet is usually a more permanent fix with further reaching impact.

Regarding this distinction about the impact of focusing on the more difficult and unseen distal causes versus the more visible and immediate proximal causes, the author believes that in the practice of safety there is a common tendency to take the easy way out and go for the "Quick Fix" of intervening at the level of the proximal cause. This is not intended to condemn safety professionals or organizations that do this, rather to point out that there is a common practice of taking the more obvious but less effective route when deciding how to intervene. There could be a number of reasons why this might be true. For example, it could be the influence of the way safety management has traditionally been conducted, such as a tendency to focus on the unsafe acts of workers that Heinrich emphasized in his work years ago. Or, it might be that addressing the distal causes would prove to be not only more difficult but also more expensive and time-consuming. Addressing the distal causes may appear more unsavory or be uncomfortable for management, as these issues are often systemic within the management system.

The following three points examine soft fix interventions, hard fix interventions, and strategies for making effective intervention recommendations.

1. Soft Fix Interventions – Contingent, Learning Interventions for Improving Safety Behavior

An article by Komaki, Barwick & Scott (1978) provides a case study demonstrating an effective behavioral process intervention. The project involved pinpointing and reinforcing safe (or desirable) behavior at a food manufacturing plant.

Plant management was expected to discuss the safety process with supervisors on (at least) a weekly basis. Supervisors were asked to help determine what behaviors should be on the

checklist and to provide reinforcement when employees worked safely. The primary metric was percent safe behavior, with a beginning baseline of 67% safe and a goal of 90% safe. One difference between this study and typical BBS approaches is that observations were conducted by students and psychologists involved in the project instead of co-worker observations.

The following results were accomplished after one year:

- The injury rates dropped over 80%
- The site safety performance went from last place to first place in the company
- The facility won a safety award from the parent company
- After the study was completed, the facility was able to maintain the process with a continuing decline in injuries

Although this study occurred many years ago, there are some lessons learned that still apply today.

One of the approaches in the Komaki project was that it **engaged employees in the safety process in simple ways.** Employees were asked their opinion when the pinpointed behaviors were established, and also when key performance targets or safety goals were determined. When employees are involved in the safety process they are more likely to *buy in* to safety efforts. Goals are more likely to be achieved and employees more committed to and excited about the safety effort.

Another strategy in the behavioral intervention was that **behavioral checklists were kept short and simple** (low complexity). The checklists were tailored to each area or unit. Behaviors on each checklist were drawn from the behavioral inventory of 35 site behaviors identified as the most important for reducing injuries and enhancing safety performance. This simplicity and brevity enabled the organization to sustain the process after the project was completed.

Feedback about the progress of the safety intervention was given frequently, three to four times a week. Since feedback involves providing information about how the team is doing in relation to their established goal (90% safe behavior), the goals were emphasized graphically and verbally. This lesson suggests that **current, frequent feedback is a key element** toward the effectiveness of this kind of safety intervention.

In many traditional safety efforts, a great emphasis is put on the negative (such as avoiding injuries, which are often infrequent) with little guidance to employees about their specific roles and responsibilities for safety. In this intervention the **focus was on the positive with clear and reinforced guidance provided to employees via pinpointed behaviors and specific safety responsibilities**.

Additional distinctions/lessons learned from the behavioral intervention include:

- Goals are effective in improving safety performance only if the goals are accepted by employees
- All levels of employees need to have precise safety roles and responsibilities and be involved in the process if the execution of a behavioral intervention is to be successful

- Feedback accompanied by praise appears to be superior to feedback alone

Safety training is another important intervention that is contingent on behavior in order to be effective. Unfortunately, many organizations seem to believe training is a quick fix to most any problem even when the organization may not even conduct a needs assessment prior to the training. In general, safety training should be the *last consideration* in solving performance problems.

A useful distinction about training is that training itself is not performance. Performance is more than just activity, and the delivery of training is an activity. In *Training Ain't Performance,* Stolovitch and Keeps explain that training itself is not performance. They define training as "structured activities focused on getting people to consistently reproduce behaviors without variation and with greater efficiency under various conditions" (p. 5). They define performance as "a function of both the behavior and accomplishment of a person or group of people" (p. 8).

It is recommended that organizations ***view and treat training interventions as an ongoing process rather than a single event.*** The big picture for training includes needs assessment, delivery of the training, learning, transfer of learning to the workplace, and sustaining the new skills and behaviors over time (Blair & Seo).

For the delivery of training to be most effective the research indicates that participants need to be engaged in the training content. Burke conducted a meta-analysis indicating:

> A meta-analysis of more than 30 years of safety training in 15 countries and 95 studies suggests that safety and health training is most effective when there is a high level of engagement. Essentially, training that is highly engaging is conducted as a conversation or dialogue. **Dialogue and reflective thinking**, versus simple feedback, is a form of engagement that appears to yield greater knowledge acquisition and improved safety performance. Burke's research suggests that "the most engaging methods of safety training are, on average, approximately three times more effective than the least engaging methods in promoting knowledge and skill acquisition (Burke, et al. in Blair & Seo, 2007).

2. Hard Fix Interventions – Fundamental, Ameliorating Interventions for Transforming Systems and Reducing Human Error

As safety has evolved we have become more aware of the importance of focusing on the *context* versus focusing on individuals. Bush (2012) notes a common issue in organizations is the "normalization of deviation" as we've been doing something a certain way (not the standard way) for so long it has become the standard. Focusing on the context does not justify the behavior – it simply explains the behavior. In the search for solutions to human error, the attitude of "Just the facts" has been very harmful to organizations over the years; Just the facts tells *What* happened, but it does not tell *Why* it happened.

In order to solve human error issues that affect safety performance, we need to understand why errors occur. Organizations often respond emotionally and at a surface level to deviant

behaviors. Dekker (2006) states, “Reactions to failure interfere with your understanding of failure; the more you react, the less you understand.” Dekker recommends, “Trade indignation for explanation; take your pick – be indignant or do something meaningful.” (Pp. 22, 47)

Manuele encourages safety professionals to become more involved in human error reduction, particularly above the worker level. In his chapter on Human Error Reduction Manuele (p. 68) states the chapter “Brings attention to human errors that derive from deficiencies in

- Organizational safety cultures
- Safety management systems
- Design and engineering decision making
- Error-provocative operations”

The reason for labeling this the hard fix is because it goes beyond the worker level into the system and takes a greater effort to understand and to implement. And since these solutions tend to be more time-consuming and expensive, they can be more difficult to sell than recommendations that stop at “blaming the operator.” However, the hard fix has a greater impact on safety performance that is more permanent, more robust, and further reaching. Dekker suggests

> Efforts to understand human error should ultimately point to changes that will truly remove the error potential from a system – something that places a high premium on meaningful recommendations. (p. 173)

Dekker further suggests we think of recommendations as predictions or hypotheses, and refers to these as High-end or Low-end recommendations. A low-end recommendation is a common starting place for focus and includes such recommendations as retraining, reprimands, discipline, termination, or tightening procedures. High-end recommendations on the other hand aim high at structural decisions regarding resources, technologies and pressures that people deal with in the workplace. This is an accurate but challenging assessment about making recommendations to reduce human error.

> The ease of implementation and the effectiveness of an implemented recommendation generally work in opposite directions… the easier the recommendation can be sold and implemented, the less effective it will be; After the [low-end] implementation, the potential for the same trouble is left in place. The error is almost guaranteed to repeat itself in some shape or form… Low-end recommendations really deal with symptoms, not with causes. After their implementation, the system as a whole has not become much wiser or better. (Dekker, p. 175)

This understanding about meaningful recommendations is essential for safety professionals desiring to add value to their organizations and contribute to reducing injuries. Dekker claims that the ability to generate structural recommendations that aim high in a causal chain is a “reflection of the quality and depth of your understanding of human error.” (p. 179)

3. Recommending Safety Interventions: Strategies that Predict a Positive Impact on Performance

Below are some individual strategies for designing effective safety interventions. These are simple concepts, but not always easy to execute.

Prevention Strategy - Recommend Early Interventions through Problem Finding and Timely Implementation

Leading safety organizations are proactive and pursue early interventions. In his excellent book, *Know What You Don't Know: How Great Leaders Prevent Problems Before They Happen,* Michael Roberto explains that great leaders aren't problem solvers, rather his thesis is great leaders are *problem finders*. Roberto gives examples of early intervention methods, as well as specific strategies to enable one to become a better problem finder.

Roberto tells an intervention story about how a number of hospitals have developed Rapid Response Teams (RRTs) in an effort to proactively attend to a patient immediately prior to an impending heart attack. This is an attempt at an early intervention versus reactively responding to a Code Blue after a heart attack has occurred. Obviously, heart attacks cannot be predicted with 100% accuracy, but the impact of the RRTs has been so dramatic that "the innovation has spread like wildfire."

Here are some excerpts from the RRT story as told by Roberto:

> Several years ago, Australian hospitals set out to save lives by acting sooner to head off emerging crises. They devised a mechanism whereby caregivers could intervene more quickly to address the small problems that typically portend larger troubles. The hospitals invented Rapid Response Teams (RRTs)… When the nurse pages an RRT, the team arrives at the patient's bedside within a few minutes and begins its diagnosis and possible intervention… To help the nurses and other staff members spot problems in advance of a crisis, the hospitals created a list of the "triggers" that may foreshadow a cardiac arrest and posted them in all the units…
>
> The invention of RRTs yielded remarkable results in Australia. The innovation soon spread to the United States. Nurses reported… that they felt much more comfortable calling for assistance, especially given that the RRTs were trained not to criticize or punish anyone for a "false alarm."
>
> A physician explained why RRTs proved successful: "The key to this process is time. The sooner you identify a problem, the more likely you are to avert a dangerous situation." A recent study published in the *Journal of the American Medical Association*, found a 71% reduction in "code blue" incidences and an 18% reduction in mortality rate after implementation of an RRT in a pediatric hospital.

> What is the moral of this remarkable story? Small problems often precede catastrophes. In fact, most large-scale failures result from a series of small errors and failures, rather than a single root cause. These small problems often cascade to create a catastrophe.
>
> Code Blue Teams are in the business of fighting fires. The Rapid Response Team process is all about detecting smoke. (Roberto, pp. 2 – 5)

Permanent Impact Strategy - Recommend Interventions that have Widespread and Long-Term Impact

Poka-Yoke - Solve Safety Problems for Good. An example of Poka-Yoke is designing connections so that they can be joined in one way only, reducing risk. It is a *fail-safe* design. Manuele says Poka-Yoke is an important but often neglected concept with regard to employee and product safety. (p. 258)

One criticism of behavioral safety efforts is they don't address system issues. However, a BBS process can be used to impact more permanent fixes if an organization knows how to take advantage of the full array of methods expected from a well planned and executed process. One simple way to affect system issues with a behavioral safety process is to follow up on detailed comments that are recorded as part of the safety coaching and feedback process.

For example, following this line of thought about using BBS processes to solve system issues, most commonly there are behavioral checklists designed for pinpointing the most critical behaviors for safety performance. On the checklist there is a space for comments. There are a few distinctions about the recording and actions taken from the written comments that enable the process to address system issues:

1. There needs to be detailed, high-quality written comments so that the committee or safety department can determine what the specific issue is. These comments stem from the safety coaching that includes a two-way dialogue in discovering what the barriers are to working safe.
2. The organization must follow up on the comments seeking a permanent solution.
3. The purpose of the follow up is to reduce exposures and enable/facilitate working safe. I believe this is what organizations that do BBS should be striving to accomplish in the short term with the longer term goal to be development of the safety culture.

Here are 3 specific scenarios illustrating how the foregoing 3 points might work in a BBS process. These scenarios are based on examples demonstrating how a simple distinction in the quality of comments can make a major impact on the effectiveness of an intervention.

1. An employee conducts an observation of the workgroup and notices a co-worker using the wrong tool for the job. He records in the comment section of the observation checklist, *"Wrong Tool Used."* Now the problem with this comment is that it does not provide enough information to pursue a system solution.
2. The same situation as above is repeated, except this time the observation coach writes the comment *"Used a cheater bar instead of the correct size wrench."* Now the Safety Committee, or company resource responsible for follow up, has a little more information. The comment is a bit more detailed than the first example. Readers may recognize that cheater

bars are commonly used in maintenance operations to gain more leverage on wrench handles. They are usually a short hollow pipe that can be slipped over a wrench handle and provide an extension for leverage. This is a risky behavior that is known to result in relatively frequent injuries.

3. The same scenario is repeated a third time, except now (perhaps with a train-the-trainer intervention for the Safety Observer) the observer writes, *"Used a cheater bar because the tool crib was out of the correct size wrenches."* Can the organization solve the issue with this information? The correct size wrenches can be ordered, someone can be put in charge of maintaining the correct tools for the workers, and a system can be established to ensure the ongoing performance.

Summarizing these three scenarios: if an organization implements a BBS process and gets vague comments like "Wrong Tool Used" then the deeper issue will not be solved. Observation cards could be received week after week with the same comment – "Wrong Tool Used"…, "Wrong Tool Used"…, "Wrong Tool Used" etc. This is not the intended purpose of behavioral safety processes. The intent of BBS is demonstrated in the third scenario, where the organization actively works at enabling and facilitating safe behavior. This seemingly minor distinction regarding the quality of comments can make the difference between an effective versus an ineffective intervention.

Fixing the Problem vs. Fixing the Blame Strategy: Recommend Leadership *Targeting the Working Interface for Reducing and Eliminating Hazards*

The working interface has been defined by Krause as "the configuration of equipment, facilities, systems and behaviors that define the interaction of the worker with the technology. Hazards exist in this configuration." In an additional clarification, Krause states

> *High-functioning safety organizations have gone beyond the entanglements of blaming and recognize that getting safety right means designing and influencing systems that reduce and eliminate exposure.* (Krause, pp. 10 & 11)

A point that Krause & Hidley make is the importance of having an effective strategy for safety improvement. Without an overarching strategy for safety improvement, the design and execution of interventions is likely to be haphazard. The authors note, "In the absence of a clearly articulated strategy, understood well and supported fully by the leadership team, the likelihood of successful execution is greatly reduced." They recommend the strategic plan for safety improvement include five elements. The third element deals with "An intervention plan that addresses the gaps and names accountabilities." (Krause, p. 164)

A large part of safety leadership is defining the specific vision for safety performance, assessing the current status of safety, and closing the gap between the vision and the current state. It's important for leadership to take responsibility for eliminating hazards where the worker and technology interact, which Krause calls the Working Interface. Leadership creates the safety culture at organizations, and they regulate the working interface. Safety professionals may not be located at a level that includes the authority to make these decisions, but safety professionals can make the appropriate recommendations to leadership regarding their responsibility for hazard reduction and elimination. It's imperative for safety professionals to gain the ongoing support and participation of upper management in the successful completion of important interventions.

Additional Factors that Can Make Safety Interventions More Effective

Dekker notes, "Systems are not inherently safe; people create safety… People in complex systems create safety." (Dekker pp. 16 and 65). The following points are things that people can do to influence the effectiveness of safety interventions:

1. Establishing a ***mechanism to monitor and reinforce the successful implementation*** of the intervention.
2. Measuring the ***Safety Return on Investment*** to demonstrate the expected return of the intervention investment over time.
3. Maintaining a ***sense of urgency and focus*** on important intervention recommendations. Establishing deadlines for corrections and holding individuals accountable is one way to do this.
4. Use behavioral issues and human error problems to discover and fix the underlying sources within the organization. For human error, Dekker recommends, "Do not get deluded by the fallacy of a quick fix. '***Human error' problems are organizational problems***, and so at least as complex as your organization…Problems result from your organization's real complexity – not some apparent simplicity, e.g. somebody's inattention." (Dekker, p. 228)

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