Using **Stories** to Teach Safety
Practical, Research-Based Tips

By Mitch Ricketts

Employee training and information programs are widely recognized as important components of workplace safety and health (Robson, Stephenson, Schulte, et al., 2010). Informational programs are so important that research teams around the world have spent decades exploring the special qualities that make certain safety and health messages more effective than others. Among the most promising outcomes of these efforts is a growing understanding that people tend to change their safety-related behavior after hearing compelling stories about others who have suffered injuries and illnesses. Indeed, safety stories seem to have a remarkable power to convey the personal relevance of this information.

The power of story-based messages has been discussed in past issues of *Professional Safety* (e.g., Cullen, 2008, 2011; Spieholz, Clark & Sjostrom, 2007). As readers make increasing use of story-based safety messages, a need will arise for guidelines that aid in the design of these interventions. With this in mind, this article sets forth a list of research-based tips for developing effective story-based communications.

What Are Stories?

A story (e.g., narrative, anecdote, case) is an account of events that take place over time. An effective story describes a single event that has powerfully affected the life of one person (or one group). Nonstory information, on the other hand, consists of broad rules, explanations and statistics that are generalized from many events in broader populations.

Stories are important because they show how the lives of real people are changed by singular incidents. In a complementary fashion, generalized, nonstory information is important because it helps an audience understand a range of facts that are relevant in broader contexts. Effective communication includes a balanced mix of general facts, along with anecdotes that illustrate how those facts can play out in everyday life.

Do Story-Based Safety & Health Messages Work?

Researchers have found that story-based interventions can lead to important and lasting changes in peoples' behavior (Ricketts, 2014). Stories capture attention, stimulate deep reflection, trigger powerful mental images, alter perceptions of new situations and influence behavior.

Story-based messages have a unique power for many reasons (Ricketts, 2014). For example, evidence suggests that people pay special attention to stories because stories tend

IN BRIEF
- Training and information can have a powerful impact on safety-related attitudes and behavior—especially when messages incorporate educational stories about particular workplace tragedies.
- Safety professionals can create customized messages based on injury cases that are freely available from various sources.
- All safety stories are not equally effective. This article includes research-based tips for selecting stories and telling them in ways that have the greatest impact.

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Figure 1
Methylene Chloride Case

Methylene Chloride Training Case

NIOSH Fatality Assessment and Control
Evaluation (FACE) Program
Iowa Case Report: 2012IA009

An experienced bathtub refinishing
technician used a paint remover to strip the
finish from a tub in a small, unventilated
bathroom. She wore a short-sleeved shirt,
painters pants, and two layers of latex
gloves. The paint remover consisted mainly
of methylene chloride (80-90%) and
methanol (5-10%).

Discussion Questions for Trainees:

1. How is methylene chloride absorbed into the body—in other words, what are the main routes of exposure?

2. What are the potential health effects?

3. What methods would you recommend for protecting the worker?

4. Based on the information given, what do you think will happen to her?

Location of full report: http://www.cdc.gov/niosh/face/pdfs/12IA009.pdf

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Figure 1: In this example of a true injury story, trainees learn the initial facts of the case and apply their knowledge through group discussion. To build suspense, knowledge about the outcome of the case is delayed (see Figure 2). Images were created from staged photographs that were traced and recolored using drawing tools in PowerPoint.

Figure 2: Outcome of the case from Figure 1. Italicized text is expected to stimulate reflection about alternative outcomes (i.e., what might have been), a technique known to trigger meaningful behavior change.

Figure 2
Methylene Chloride Outcome

Outcome: Methylene Chloride Case

NIOSH Fatality Assessment and Control
Evaluation (FACE) Program
Iowa Case Report: 2012IA009

A 37-year-old bathtub refinishing technician
was working alone in a small, unventilated
bathroom at an apartment complex. She was
using a methylene-chloride paint stripper without
ventilation or respiratory protection.

Family members were concerned when she
did not show up to get her children after school.
When checked upon, she was found dead at the
scene, slumped over the side of the bathtub.

Autopsy findings confirmed she died from
overexposure to methylene chloride and
methanol. Investigators estimated the airborne
concentration of methylene chloride in the room
may have reached 10 times the level considered
immediately dangerous to life and health.

*A fresh-air blower and supplied-air respirator
were found in her work van—apparently, she had
chosen not to use them.*

Final Discussion Question:
The respirator found in the worker's van consisted of a half-face mask, with a fresh air pump
equipped with HEPA filters and 40 feet of 5/8" tubing. It was provided by her employer. Based on
OSHA's methylene chloride standard, was this an acceptable respirator for protection against
airborne methylene chloride?

Location of full report: http://www.cdc.gov/niosh/face/pdfs/12IA009.pdf

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to be more interesting than generalized information. It has also been shown that stories are easy to comprehend and remember because they illustrate cause-effect relationships in an intuitive manner. Finally, neurological research has demonstrated that stories trigger brain activity, which mirrors the experience of living through an actual event. People comprehend stories in part because their brains activate many of the same circuits that would be engaged if experiencing the story events firsthand. It is no wonder scholars have argued that a gripping story may have nearly as much personal impact as an actual event that happened to someone (Stapel & Velthuijsen, 1996).

The best way to convey the essence of story-based interventions is through examples of training materials that incorporate stories. Figures 1-6 are drawn from actual safety interventions. Some figures describe the initial events of injury cases, complete with sample questions to guide group discussion. Other figures include case outcomes, with additional discussion questions.

Where to Get Safety Stories

Effective story-based messages can be developed by using injury cases from various sources. Here are some examples:

•Many respected agencies publish injury reports that are freely available online. Examples include Fatality Assessment and Control Evaluation (FACE) reports (NIOSH); fatality and catastrophe investigation summaries (OSHA); and CSB investigations.

•Medical and scientific journals also publish case reports. These can be located through search engines such as PubMed (National Center for Biotechnology Information) and copies of the reports can be ordered through interlibrary loan.

•Regional workers' compensation authorities publish many case reports online. Notable examples include WorksafeBC and WorksafeNB.

•Finally, news outlets report workplace injuries, but it is best to use these sources only when case details can be verified by other means.

Using Stories Effectively: Research Findings

Injury case reports must usually be rewritten to eliminate unnecessary details, minimize technical language and clarify cause-effect relationships. The following research-based recommendations can help guide the process of crafting effective story-based messages.

1) Use stories and generalized information in a balanced manner to capitalize on their respective strengths. Stories help audiences recognize the personal relevance of a topic, while nonstory information (general facts) provide authoritative details (Braverman, 2008; Rook, 1986). To put this research into practice, use stories to introduce safety messages and when changing topics. Stories at the outset help capture attention and trigger reflection. Once personal relevance is apparent, generalized information can be used to promote a more thorough understanding of the issues.

Selected Findings From Four Decades of Research in Narrative Health Communication

The literature on story-based health communication is vast; an exhaustive treatment of findings is beyond the scope of this article. The following examples offer a sampling of the varied approaches that have been employed.

1) Story-based interventions can trigger action to help others. Ricketts, Shanteau, McSpadden, et al. (2010), investigated protective behavior among teams of research participants who assembled children's swing sets. Unknown to participants, the teams were randomly assigned to assemble swings using instructions containing different types of warnings (story-based vs. nonnarrative). The warnings addressed assembly errors that could injure children who might later use the swings. As an example, consider that long, projecting bolts may cause injuries by puncturing children's eyes or entangling their clothing, as discussed in the following story-based warning that was used in the study:

A 2-year-old girl was strangled when her necklace became caught on a long bolt while she was playing on her swing set. The girl's grandmother found her hanging by the neck from the frame of the swing with her necklace caught on the bolt. By the time her grandmother found her, the girl's body was limp and she was not breathing (Chin & Berns, 1995).

Ricketts, et al. (2010), observed that story-based warnings such as this had a dramatic impact on compliance with assembly instructions. In fact, teams exposed to story-based warnings made about 20% fewer safety-related assembly errors, compared with teams exposed to equivalent nonnarrative warnings.

2) Story-based interventions can trigger action to protect self. Baezconde-Garbanati, Chatterjee, Frank, et al. (2014), recently examined the impact of an intervention designed to promote cervical cancer screening (by Pap test). The intervention consisted of a story of one family's experiences with cervical cancer screening. The story had a powerful impact, leading to a significant increase in cervical cancer screening among women who were exposed to the story during the study.

3) Story-based interventions can reduce the incidence of disease. In a series of three studies, Lydia and Carl O'Donnell evaluated two story-based interventions designed to increase condom use among patients at a sexually-transmitted disease (STD) clinic (O'Donnell, O'Donnell, San Doval, et al., 1998; O'Donnell, San Doval, Duran, et al., 1995a, 1995b). All study participants received STD prevention information and coupons they could redeem for condoms. In addition, some participants were randomly selected to view videos that told the stories of people who overcame barriers to condom use. The results were impressive: Compared with the other patients, those who watched story-based videos contracted significantly fewer new STD infections during the study periods.

4) Story-based interventions can reach vast audiences, leading to measurable cultural impacts. Entertainment-education promotes behavior change by inserting health-related storylines into popular television programs. For example, popular native-language television dramas have been used to promote safe-sex behavior in areas of the world that have been ravaged HIV and AIDS (e.g., Singhal, Cody, Rogers, et al., 2004). Health messages have also been embedded in American television dramas (e.g., *ER, Frasier, Mr. Rogers' Neighborhood, Guiding Light* and *Days of Our Lives*) to promote immunization and other prohealth behaviors (Glik, Berkanovic, Stone, et al., 1998). Quantitative reviews have demonstrated that story-based entertainment-education has a significant impact on health-related behaviors throughout the world (e.g., Shen & Han, 2014).

5) Story-based interventions can overcome resistance to persuasion. People often resist attempts at persuasion by raising defensive counterarguments to messages used in interventions (e.g., Petty & Cacioppo, 1986). Such resistance can dramatically reduce the persuasiveness of health messages. As documented by many researchers, however, narratives weaken people's tendencies to generate and consider counterarguments (e.g., Dal Cin, et al., 2004). People argue less with story-based messages, in part because stories comprise a more subtle form of persuasion and also because it is hard to argue against an event that has already happened (or a plausible incident that could happen).

6) Stories and nonnarrative messages each have their place. Over the years, researchers have sometimes found stories to be more effective than nonnarrative interventions, while at other times the reverse has been true. With the ever-increasing accumulation of data, it is apparent that stories and nonnarrative messages each serve different purposes, and their relative effects depend largely on the outcomes measured.

The consistent picture emerging from modern research is that story-based interventions most strongly affect people's intentions to change their behavior, while nonnarrative messages most strongly affect cognitive beliefs and attitudes (e.g., De Wit, Das & Vet, 2008; Zebregs, van den Putte, Neijens, et al., 2015). In other words, the question is not whether trainers should use stories or generalized facts; instead, the question is the extent to which trainers use each form of communication to its relative advantage (i.e., stories for changing behavior, generalized facts for changing knowledge and attitudes).

Note. These studies were selected by the author as representative examples of hundreds of reports identified in searches of databases that include PubMed, PsychInfo, ProQuest Research Library and many others.

Figure 3
Mowing Training Case

Mowing Training Case
OSHA Accident Inspection Report 125967349

A worker was operating a walk-behind mower. The discharge chute became clogged with grass.

The worker responded as follows: He held the kill-switch bar with one hand to keep the engine running...

... then, with the other hand, he pulled the grass out of the clogged discharge chute.

Discussion Questions for Trainees:

1. What do you think will happen to the worker?

2. Discuss any similar cases that you know.

3. Describe what you believe are the most important precautions for unclogging mowers.

4. How does this situation relate to mowing activities at *our workplace?* What types of mowers do we use? Where/when do clogs tend to occur? Are current unclogging precautions adequate? Are any changes needed?

Location of full report:
https://www.osha.gov/pls/imis/establishment.inspection_detail?id=125967349

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Figure 3: Discussion questions encourage workers to imagine how the case applies to their own work. The images are staged photographs (with the mower off and spark plug wire removed). Figure 4 presents the outcome.

Figure 4: Outcome of the case from Figure 3. The illusion of impact was created in Powerpoint.

Figure 4
Mowing Training Case Outcome

Outcome: Mowing Case
OSHA Accident Inspection Report 125967349

With the engine running, a worker used his hand to remove grass from a clogged lawn mower.

The spinning blade struck his hand, causing severe lacerations. He was hospitalized for two days and lost one of his fingers

Final Discussion Question:
Would this injury have been prevented by the precautions you normally observe at work? Explain.

Location of full report:
https://www.osha.gov/pls/imis/establishment.inspection_detail?id=125967349

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2) The best stories explain and highlight key message points without creating distractions. Relevant anecdotes increase the power of safety messages; however, message impact may be undermined if stories are irrelevant, distracting or too detailed (Rey, 2012). This research has several practical implications. For example, it is usually best to keep stories brief. An effective story includes just enough information to make the event and victim seem real; if some details are left to the imagination, audience members will fill in gaps with relevant images from their own experiences. In particular, avoid tangents that detract from the main theme such as excessive details about physical wounds, suffering or grieving survivors.

Another way to minimize distractions is to ensure that the story's theme is not inflammatory. For example, when audience members consist mainly of line workers, do not use a story about an irresponsible supervisor whose actions led to a line worker's death. Such a story may foster outrage and blame, rather than introspection and learning. (However, stories about supervisors' mistakes are certainly appropriate when audiences consist of supervisors.)

3) The best stories demonstrate convincing cause-and-effect relationships. Stories are most effective when they include clear connections between causes (e.g., malfunctioning equipment, poor management, unsafe behavior) and effects (e.g., injuries; Voss, Wiley & Sandak, 1999). In fact, when cause-effect relationships are weak, stories may backfire by triggering disbelief in the overall message (Thrasher, Arillo-Santillán, Villalobos, et al., 2012). The simplest ways to demonstrate a cause-and-effect relationship include telling story events in chronological order and using only those stories for which cause and effect are indisputable (Voss, et al., 1999).

4) In the best stories, audience members feel connected to at least one of the main characters. Stories are most persuasive when message recipients identify with important story characters (Dal Cin, Zanna & Fong, 2004). This tends to happen when characters are similar to audience members (with respect to occupation or life experiences) or when message recipients can imagine themselves having a personal relationship with a character. In contrast, audiences are unlikely to care about unpleasant or offensive characters.

These findings imply that stories should have central characters who share important attributes with message recipients. At the very least, avoid stories in which main characters differ from audiences in ways that relate to injury causes and effects. For example, it is unlikely that highly skilled workers will find much personal relevance in a story about a worker who is described as untrained, unskilled or young. Likewise, young audiences may fail to internalize stories in which elderly workers are injured due to technological incompetence or

aging factors such as poor vision. When characters differ from audience members in relevant ways, audiences may dismiss a story as something that could never happen to them.

5) The best stories describe situations that are familiar enough to be understood, and outcomes that are surprising enough to spark interest and reflection. Stories can have great personal impact when they include surprising events in familiar settings (Schank & Abelson, 1977). Familiar settings relate new information to prior knowledge, which fosters learning (Novak, 2009). At the same time, surprising events capture attention, trigger deep thought and create lasting memories (Gendolla & Koller, 2001; Stangor & McMillan, 1992). To summarize the practical implications: Story contexts and events should be familiar so that audiences can predict the intended outcome; this helps ensure their surprise and interest in an unusual ending.
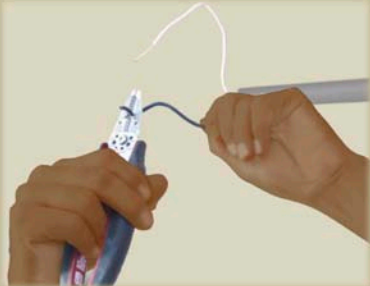
6) The best story-based messages emphasize important preventive measures that can be implemented successfully by audience members. People change their behavior when outcomes are important and are fully under their own control (Glanz, Rimer & Viswanath, 2008). In contrast, when outcomes are trivial or controlled by others, people maintain old behaviors simply because personal change seems fruitless.

Stories should involve injuries caused by factors that audience members can change—otherwise, there will be no clear way to prevent similar injuries in audience members' own workplaces. Stories for line workers should typically focus on injuries caused by workers' own unsafe actions; stories for supervisors should underscore injuries caused by supervisory errors; stories for managers, on the other hand, should focus on injuries related to deficiencies in organizational policies, culture, facilities or equipment.

7) The best stories have an element of suspense. Suspense emerges while audience members wait for important events to unfold. People become emotionally engaged in suspenseful stories. Suspense is a feeling of excitement or anxiety that develops while anticipating a critical event (Cheong & Young, 2008). At least two implications arise from this research. First, stories should deal with serious, rather than trivial, outcomes. Second, suspense can be generated by inserting a brief time delay—for instance by telling the first half of the story, asking participants to predict what will happen next, then discussing the outcome (as in Figures 1-6).

8) The best stories are those in which important outcomes would change if characters had acted differently. Story-based messages are especially persuasive when audience members imagine that characters could have avoided tragedy by making better decisions (Connolly & Reb, 2005; Tal-Or, Boninger, Poran, et al., 2004). Imagining alternative outcomes (i.e., what might have been) promotes behavior change by prompting thoughts

Figure 5
Lockout/Tagout Case

Lockout/Tagout Training Case

NIOSH Fatality Assessment and Control Evaluation (FACE) Program
California Case Report: 06CA007

An experienced electrician was replacing electrical wires in a lighting circuit located in the ceiling of an industrial manufacturing facility. Without shutting off power, he pulled out his wire-stripping pliers and began to work on the circuit.

Discussion Questions for Trainees:

1. Based on the information given, what do you think will happen to the worker?
2. What would you include as the most important lockout/tagout precautions in this situation? Explain your choices.
3. Why do you suppose the worker did not follow those precautions?
4. When are workers most likely to take dangerous shortcuts at *our workplace?* Why does this happen? What can we do to make it easier for workers to observe the precautions they know they should be following?

Location of full report: http://www.cdc.gov/niosh/face/stateface/ca/06ca007.html

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Figure 5: Discussion questions 3 and 4 encourage audience members to have an honest discussion about the impact of production pressures on safety (with the goal of reaffirming safety's importance even when pressured by time). The image is a staged photograph with the background removed and edges softened using Microsoft's artistic effects function. Figure 6 presents the outcome.

Figure 6: Outcome of the case from Figure 5. The images are photographs with backgrounds removed.

Figure 6
Lockout/Tagout Outcome

Outcome: Lockout/Tagout Case

NIOSH Fatality Assessment and Control Evaluation (FACE) Program
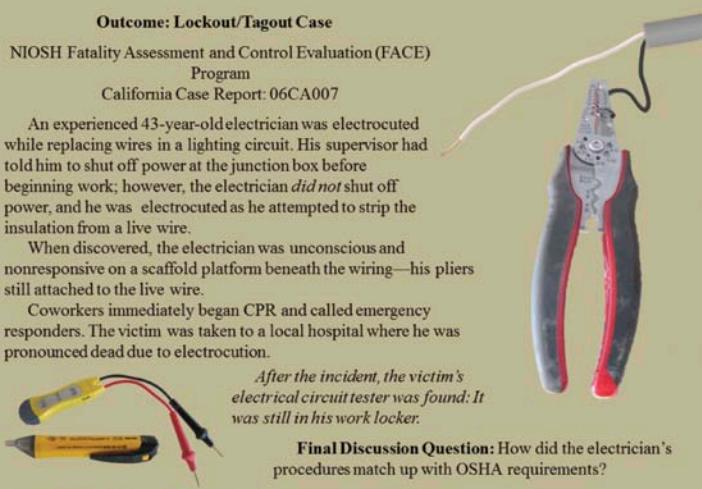California Case Report: 06CA007

An experienced 43-year-old electrician was electrocuted while replacing wires in a lighting circuit. His supervisor had told him to shut off power at the junction box before beginning work; however, the electrician *did not* shut off power, and he was electrocuted as he attempted to strip the insulation from a live wire.

When discovered, the electrician was unconscious and nonresponsive on a scaffold platform beneath the wiring—his pliers still attached to the live wire.

Coworkers immediately began CPR and called emergency responders. The victim was taken to a local hospital where he was pronounced dead due to electrocution.

After the incident, the victim's electrical circuit tester was found: It was still in his work locker.

Final Discussion Question: How did the electrician's procedures match up with OSHA requirements?

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Location of full report: http://www.cdc.gov/niosh/face/stateface/ca/06ca007.html

about appropriate preventive actions and by helping imagine the regret one would experience in similar circumstances.

These findings suggest that OSH professionals should use stories in which the central tragedy would have been averted had story characters acted differently. It is also helpful to ask participants what the characters should have done and how this would have affected the characters' lives.

9) Messages are most effective when complex ideas and events are clarified with illustrations. Information is more easily understood when it is presented using a combination of words and images, rather than words or images alone (Houts, Doak, Doak, et al., 2006; Mayer, 2009). Furthermore, although images are helpful for all audiences, they are especially important for those with limited language skills.

This research suggests that OSH trainers should illustrate important and potentially confusing story events with appropriate photographs, videos or sketches. In keeping with previous tips, the best images will relate to the main points of the message. Include only the most important details, and depict people who share important characteristics with the intended audience.

> The best stories describe situations that are familiar enough to be understood, and outcomes that are surprising enough to spark interest and reflection.

Tips in Brief: A Guide to Using Stories Effectively

• Use a balance of stories and generalized information. Stories help audiences understand the personal relevance of a message, leading to behavior change, while nonnarrative information (general facts) help audiences gain a more thorough understanding of the issues, leading to changes in knowledge and attitudes.

• Use stories to illustrate key points, but keep stories focused and relevant. Avoid unnecessary details and tangents that may detract from the message's main theme.

• Use stories that clearly demonstrate convincing cause-and-effect relationships. Safety stories are most effective when connections between causes and effects are indisputable and when told in chronological order.

• Use stories whose central characters share important attributes with audience members. Stories are more effective when audience members can understand the actions and motives of at least one story character. Impact tends to be greatest when story characters are similar to audience members with respect to occupation, life experiences, values or other important characteristics.

• Use stories that involve familiar situations, but unexpected outcomes. Stories have great personal impact when they include surprising events in everyday settings. Use stories with ordinary beginnings so audiences will know what should happen next. This will help them appreciate the significance of any unfortunate outcomes that could have been prevented.

• Use stories that emphasize preventive measures the audience members can control. For example, stories for workers should involve solutions that would be under their own control (and not the control of management); otherwise, they may conclude the responsibility lies with others (rather than themselves).

• Use stories that develop suspense so the audience will want to know the outcome. People become emotionally engaged in suspenseful stories. To create suspense, use stories that involve important issues and ask the audience to discuss possible outcomes before telling them what actually happened.

• Use stories in which outcomes would change if the characters acted differently. Messages should prompt audience members to consider the personal significance of preventive measures and outcomes. Make sure each tragedy in the stories could have been prevented, and ask trainees to discuss how the lives of characters would be different had the precautions been implemented.

• Use images to illustrate the important objects and events in the stories. Information is more easily understood when it is presented using a combination of words and images, rather than words or images alone. Use photographs, videos, sketches or working models to illustrate important or potentially confusing events.

Conclusion

Story-based interventions can have powerful effects on important attitudes and behaviors. Customized safety messages can be created from injury cases that are freely available from many sources. Safety professionals are encouraged to develop story-based messages that are consistent with the findings of research—using anecdotes that are simple, focused, relevant, personal, suspenseful and cause-effect oriented, and that emphasize preventive actions that fall under audience members' full control. For more effective messages, incorporate photographs, videos or sketches that illustrate the messages' main points. **PS**

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