Training to Improve Emergency Communication Skills

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Abstract

This paper introduces a method for teaching workers to communicate necessary information when giving or receiving emergency warning messages. Research has shown that when an emergency occurs, people may not get the information they need to take appropriate action. Interviews conducted with 48 underground coal miners who had escaped mine fires revealed that the warning information provided was inadequate. In some cases, sufficient information was not provided to the endangered miners. At other times, miners failed to ask for information they needed to plan and execute effective escapes. Researchers from the NIOSH Pittsburgh Research Laboratory have been studying the content of emergency warning messages and have developed an emergency communication protocol. A training intervention that presents the protocol and related mental cues is being evaluated for effectiveness in improving the content of emergency messages. In this paper the protocol is presented and the training package described. The evaluation procedures and a summary of the analyses conducted to-date are also provided. The training package was developed for use with underground coal miners, but could easily be modified for emergency communications training in other settings.

Introduction

Communications technology available during an emergency will only enhance response if the messages conveyed are appropriate and complete. In the case of underground coal mine fires, initial warnings have not always provided the information required for efficient responses. Even when additional information was available, it was not communicated to those who needed it to make effective decisions regarding their safety and/or the appropriate response to the event (Mallett, Vaught, and Brnich, 1993). The authors interviewed 48 miners who had evacuated from eight areas of three burning mines. Only two of those people knew the location of the fire from which they were attempting to escape. The lack of information sometimes resulted from poor communication by the message sender and sometimes from a lack of listening or questioning on the part of the message receiver. In an effort to improve emergency communications, the authors determined which types of information are critical during a mine emergency and developed materials to train miners in effectively giving and receiving warning messages.

The Emergency Communications Protocol

In developing emergency communications training materials, the authors worked with safety professionals from three mines. They questioned these safety professionals to determine the information required for an effective mine emergency response and to prioritize the information. The original list of items to be communicated was too long to be easily remembered by miners under stressful conditions. The list was then collapsed into six basic categories. The three initial categories provide information that is essential to an efficient response. These categories are labeled '**who**', '**where**', and '**what**'. Additional information that is helpful, but of secondary importance, is identified by secondary categories labeled

'**miners**', '**event**', and '**response**'. All of the information that the safety professionals indicated as important fits within the six categories.

These categories of information that are needed during a mine emergency constitute an emergency communications protocol. This protocol defines the three primary types of information and the three secondary categories required for an effective response. The optimal order of the information is also defined.

The first step of the protocol is identification of the people who are interacting. This is important because people react differently based on who gives them information (Mileti and Fitzpatrick, 1991). For example, think about the different reactions that might happen in this situation. Someone calls the mine's communications person and says, "There's a large fire going here! Get help!" What would happen if the person making the call had been on the mine rescue team for 10 years and were known as a calm and levelheaded person? Would reactions be the same if the person making the call were a young, inexperienced miner who had only been working in the area for a month? The person receiving the warning is likely to react much more quickly based on the warning given by the mine rescue team member than on one given by an inexperienced miner. In the second case, the person taking the call will probably seek confirmation of the problem before acting.

The second step is to define the location of the problem. Giving the location of the problem may seem like common sense, but it doesn't always happen. A communications person at a large underground mine received a call from someone underground saying, "There's a fire on the conveyor belt!" The person making the call then left the phone and went to start fighting the fire. With that warning, the communications person knew only that somewhere on the mine's seven or eight miles of belt there was a fire. The first task became location of the problem, rather than initiation of an effective response.

The third step in the protocol is to tell exactly what is happening. Again, this may seem like common sense, but it does not always happen during an emergency. At one serious mine fire a warning message was given, ordering everyone on the working section to evacuate. Miners who had been near the phone when the call was received went to gather the other members of their crew. One of these miners gave a warning to his crew saying, "Come on down to the mantrip. We're going out." Since the belt was down and it was close to quitting time, the miners receiving this message thought they were just leaving the section a little early and went through their normal end of shift routine. Valuable evacuation time was lost.

The order of the protocol's primary categories is important. The people interacting are identified first so miscommunication will be lessened. The location is then given so this vital item will not be forgotten. The emergency should be defined only after the first two steps are complete. Making "what" the third item will keep the person receiving the message from anxiously responding before knowing all of the relevant information. In one case, a person receiving a warning about an underground mine fire left the phone as soon as he heard the word "fire" and obtained no information about its location to help determine appropriate actions and evacuation routes. The primary categories of the communications protocol, therefore, are **who**, **where**, and **what**.

The secondary categories are less critical, but will improve response. The first category, "miners", refers to individuals who are or could be in danger. If information is available about endangered people, communicating that information will make their rescue a first priority. The second category is titled "event". During this step, a report of the scope of the emergency is given. This allows the message receivers to begin appropriate preparations for the response. For example, they would know whether ambulances or only first aid kits would be required. The last step of the protocol is "response". At this point, any response actions that have been taken should be reported. This will lead to a decrease in the duplication of efforts and will therefore save time. The secondary items of the protocol, **miners**, **event**, and **response**, focus on improving the efficiency of the overall response activities.

The emergency response protocol was developed and then authenticated with various experts in mine safety. Government officials, company personnel, and labor union representatives reviewed the protocol. Researchers then worked to develop a means to implement the protocol in mining.

Emergency Communications Training Package

The authors created a training package called the Emergency Communication Triangle to educate miners about the importance of emergency communications and to teach them the six steps of the protocol discussed above. This material was designed for use in short training sessions such as start-of-shift safety or "toolbox" talks. The content of the talk outlines the communication protocol and provides an advance organizer to help workers remember its most important aspects. Also included in the training package is a decal that can be placed on a worker's hard hat, and is intended for use as a mnemonic device during an emergency (See Figure 1). The information can be presented in approximately fifteen minutes and is appropriate for workers at all experience levels. While the examples and illustrations were taken from the underground coal mining industry, the training can be tailored to any work setting by substituting appropriate examples.

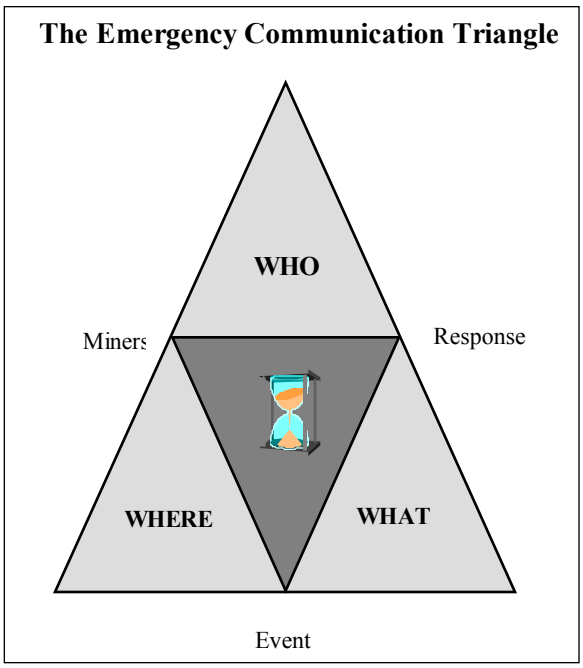

Figure 1: Communication Triangle Sticker

Procedures for Evaluating the Training Package

A field experiment was conducted at one mine to evaluate the emergency communications intervention. The study used a one-group pre-test/post-test design. Data were collected during emergency communication role-play simulations. Miners were asked to pretend that an emergency situation was developing in their mine. Each subject played the role of a miner at a specific location, performing a given simulated activity. The members of one group of subjects were asked to use communication equipment to

call out of the mine and give a warning about an emergency that investigators contrived for them to "discover." Members of another group received warnings regarding simulated emergencies occurring elsewhere in the mine. All simulated calls were tape-recorded.

During the pre-test, 40 simulated calls were recorded. After completion of the initial round of data collection, the training intervention described above was implemented with all of the miners at that mine. Approximately two months after training, the simulations were repeated and data were collected from 18 simulated warnings. The recorded emergency calls from both rounds of data collection were transcribed verbatim. The content of these warning messages that were given and received by miners during their "emergency" is the focus of an on-going analysis.

Evaluation Results To-Date

An initial content analysis compared the pre-intervention and post-intervention calls, relative to each step of the communications protocol. In all six instances, a larger percentage of miners were found to have relayed category specific information during the post-training simulations. Figures 2 and 3 provide the percent of miners giving and/or asking for information related to each category.

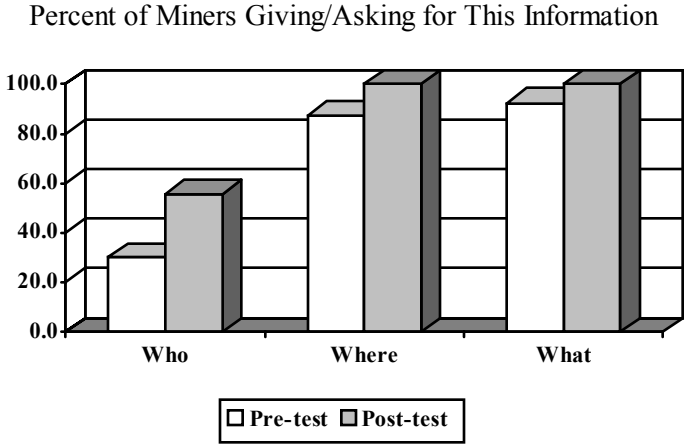

Figure 2: Pre-test/Post-test Results for Primary Categories

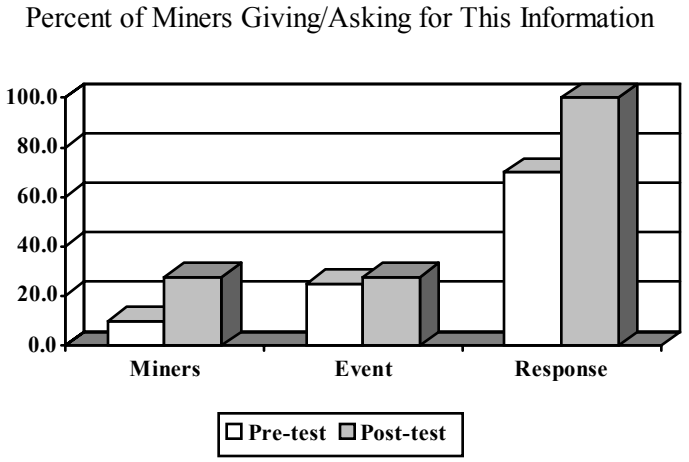

Figure 3: Pre-test/Post-test Results for Secondary Categories

Clearly, the miners provided information during their post-test warnings that they had not included before being trained. The authors have not yet concluded a more detailed analysis of the warning messages, however. The *quality* of the information is now being studied and will inform any future adjustments to the training intervention.

Plans for Future Research

It is clear that one adjustment to the training intervention will involve use of the decals for their intended purpose. The authors discovered early in their post-test evaluations that miners had neglected to place the decals on their hard hats for use as mnemonic devices. Thus, any improvements in emergency communication resulted from the pre-test experience and subsequent training rather than from reference to the triangle. It is expected that in future training sessions the decals will be placed upon miners' hard hats during their class. They will then be given explicit instructions to refer to the triangle at any time they are sending or receiving warning messages.

Since the Emergency Communication Triangle is part of a training package, its efficacy must be assessed in real-world training situations. To that end, the authors have chosen a site for a further experiment. A pre-test will be conducted with a sample of workers. Then, the first-level supervisors (who are responsible for delivering safety talks) will be trained to use the instructional package, including placement of the decal on miners' hard hats. They will then be asked to convey the message, with an accompanying decal, to their workers. Approximately two months after training, a post-test sample will be evaluated. It will be possible to determine if the decal is actually used as a mnemonic device during transmission or reception of warning messages, and whether the complete package, as used by a lay person responsible for safety talks, is effective.

References

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