

# A Practical Approach to Workplace Communication Assessment: Or “Keep Your Head Down and Your Ears Open”

Sandra MacLean

I often work on hearing conservation and communication issues with firefighters. One time, while performing audio dosimetry during practice fires, I noticed some press media entering the building that was to be burned. I asked the training officer how they were able to do that. He indicated that, with a little training, a whole lot of equipment and an experienced firefighter at their side, they could go into the burning building. He looked at me and asked if I wanted to do it as well. I said, “Certainly!”

It wasn't until a few months later that I received a call from him indicating that now was the time. Sooner than I thought, I was in full bunker gear with an air tank and self-contained breathing apparatus (SCBA). With a little instruction, over 50 pounds of gear and a seasoned veteran never more than a couple of feet from my side I entered the building. We took our positions on the second floor and “Torch” set some wood pallets on fire. I was lying flat, face down on the hallway floor, in a couple of inches of water (from previous evolutions) trying to get used to breathing from the tank and realizing a strange sense of insulation from the intense heat that was quickly increasing around me.

I was mesmerized by the behavior of the fire and flames so close to me. The dancing, intoxicating flames I remembered seeing in firefighter films were there right before my eyes. I felt the urge to get up and move back a little. As I rose, I felt as though something was pushing down on the top of my head. My escort pulled me down immediately and said “Stay down! It's 1200 degrees right up there!” The evolution went well and I was glad to have experienced a taste of what firefighters go through.

The next evolution had significant problems. The fire grew intensely hot too quickly, the recruits were panicky, and their radio communications fell apart in

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the pandemonium. They would key the radio after they had already started speaking and with the background noise they were unable to discern what the speaker was saying. Remember, firefighters are usually speaking through SCBAs that sound very similar to putting your hand firmly over your mouth and speaking. I was absolutely amazed at how their voices raised noticeably in pitch, almost sounding like little children and squeaking. If you have ever heard a tape of radio communications in a fire, you would know how difficult it is to hear even with normal hearing. I had accomplished what I had set out to do—immerse myself in their world to better help me understand their communication challenges.

Now I am not necessarily advocating going into burning buildings, but rather

learning what is involved in a job before judging what a person can or cannot do. Many jobs, including firefighting, are hearing-critical. Employees experience a need to effectively communicate in their daily tasks without posing a risk to themselves or others. The hearing conservation professional may be asked to provide assistance in the determination of an employee's ability to function safely in noise and to meet the communication demands placed upon them. Specifically, hearing-critical functions of the job in question must be identified and then the employee's ability to function in the representative environment must be tested and interpreted.

It is paramount to get out into the work environment to properly determine what the needs for communication are. Assessment of communication performance is often better accomplished in a “real world” context, as traditional methods of clinical evaluation are usually not a reliable predictor of field performance. The determination of the levels necessary to hear communications in the field are critical, as is the question of whether a worker's hearing capability is appropriate to the task.

The following key points address the basic areas and methodology that I utilize in a workplace communication assessment. Certainly, in the real world it is not always possible to address all these areas. Sometimes work sites are too remote or just downright dangerous. As in many areas of hearing conservation, one must be prepared to go with the flow.

## **Interviews (in person or by phone)**

This helps to establish assessment needs and identify any past communication problems (rule out near misses or accidents). Have your questions well thought out ahead of time and often most questions will come up as you conduct the interviews. Sometimes the work site

is just not accessible or funds are limited, not allowing travel to the site. Often a closer, very similar site may be available or the interviews may need to be conducted by telephone.

### **Identification of Essential Job Tasks and Essential Auditory Tasks**

Interview representatives of the employer and the employee in question (where appropriate) as well as others as deemed necessary to establish a list of essential job tasks. Also identify the auditory tasks specific to the employee's job position. Hearing-critical situations should be identified and communications needs assessed.

Auditory warning signals, such as firefighter PASS devices (warning system worn by a firefighter which sounds if they have not moved for a determined amount of time), are often too loud or too weak and are sometimes even shut off by the firefighter as a nuisance factor! PASS devices sound at well over 100dBA (decibels, A-scale) and will go off more often than some firefighters like when they are not in harm's way (such as anchoring themselves against a wall while operating a hoseline). It is crucial to determine the audibility of any critical signal or communication, as well as whether or not the signal can be adequately distinguished from other sounds in the environment. Auditory warning signals may be heard, but not recognized, thereby preventing reaction to it in the way intended.

The following are key tasks for firefighters in various identified settings:

- Speech intelligibility in quiet—discerning conversation over a two-way radio as well as in noise—hearing instructions over the sound of trucks and sirens.
- Sound localization—locate a fallen firefighter by the sound of his/her personal alarm device.
- Sound discrimination—hear and discriminate the “bells” on an SCBA indicating low air.

### **Noise Level Measurements**

One should measure background noise levels for various job tasks previously identified. Additionally, warning signal/communication levels must be

measured. Signal-to-noise level measurements are assessed to determine signal audibility and whether or not it falls within the psychoacoustic parameters necessary to properly alert listener to the warning/communication. A good rule of thumb is that the signal-to-noise ratio should be +10 dB (meaning that the warning signal is 10 dB higher than the ambient noise environment) for individuals with normal hearing and +15 dB for individuals with a hearing loss. It is wise to address this even in noise level studies that are not being conducted specifically for communication assessment. How often have you heard a PA system that is either too loud or too soft? Be aware that most warning signals are not “sounding off” when you are conducting a noise level study, so you must ask about them.

Measurements (i.e., sound pressure level and spectrum of warning signals, speech communications, and ambient noise) serve to characterize the sound environment for each identified job task. Octave band measurements (a way of looking at the energy of a sound at various pitches) should be measured for communication and warning signals as well as various ambient environments. This is best conducted using a Precision Real Time Analyzer. These can be rented for about \$800/week. These measurements, along with an individual's hearing test results and/or hearing protection device attenuation (as appropriate), can be used in predicting the detectability of warning signals or communications in various noise environments, using a computerized model called Detect-sound™.

Consider digital audio taping (DAT) of samples of job-specific background noise and communications for later use in the laboratory or in the development of a taped job-specific task test to be used in a clinical setting. DAT recorders are available for rent for approximately \$75.00/day.

### **Development of Job-Specific Phrases**

This is perhaps the simplest step in the process. Typically, I have utilized dispatchers and/or firefighters in communications to develop job-specific phrases prior to the testing. These phrases can be used in field-testing as well as

in the development of taped testing materials. Be aware, however, that in the case of the fire service, phrases indigenous to one department may seem completely foreign to another and, therefore, be completely inappropriate. Find someone who has a good working knowledge of the communication phrases of the job in question or observe and record the job phrases and ask a lot of questions to make sure that critical phrases are not missed.

### **Reasonable Accommodation Assessment**

Reasonable accommodations, such as assistive listening devices (ALDs) often need to be recommended. It is important to determine if they will work in the environment in question. For devices linked to radios, prior knowledge of the specific radio utilized is helpful.

In closing, I want to tell the reader what happened as I was writing this article. I was flying from Seattle to Anchorage and had been working on my draft for a couple of hours. My fingers were flying over the keyboard and I was nearing the completion of the document. I was enjoying the music I was listening to under headphones on my CD player. It certainly helped to mask the din of the jet engines. Then, all of a sudden my screen went black. I gasped not believing what had just happened! I tried to recover the document but stopped quickly as the battery on the laptop was dead. Once I was able to plug into a power source I went into the document and it was a mere skeleton of what I had written. A friend showed me how to recover temporary autosave files, and then it dawned on me: I almost lost my entire article because I didn't hear a warning signal that sounded before the screen went blank. The irony was amazing. I recovered what I thought I had lost, but lives lost due to communication breakdowns cannot be recovered. We cannot underestimate the importance of helping keep workers safe on their jobs.

### **NHCA**

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