Risk Communication in Deployment-Related Exposure Concerns

Susan L. Santos, PhD, MS, Drew Helmer, MD, MS, and Ron Teichman, MD, MPH, FACP, FACOEM

Objective: Veterans Affairs and Department of Defense health care providers and educators serve as primary channels of communication with veterans but may not understand the importance and benefits of risk communication to inform and empower veterans about actions to take or not take to improve the quality of their health. This article describes the importance of understanding and applying risk communication principles in communicating to veterans about the potential for health concerns/impacts from deployment-related exposures. **Results:** The principles of risk communication as relevant to clinical encounters are presented, focusing on a review of risk perception factors influencing deployment-related exposure concerns. Results show that risk communication can impact how veterans will take in and process information about deployment-related exposures. **Conclusion:** This article illustrates how providers can effectively use risk communication to structure better clinical encounters and communication with veterans.

Learning Objectives

- Define the concept of risk communication and its importance in communicating with veterans about potential health concerns from deployment-related exposures.
- Identify some important risk perception factors in communicating exposure concerns.
- Give examples of how risk communication can be used effectively to structure clinical encounters and communication with veterans.

The field of risk communication has evolved greatly over the last 30 years as public awareness and concern over the environment and possible effects on public health have heightened. This general concern spurred a series of regulations in the 1970s and 1980s to evaluate more fully the potential for health effects and, in addition, the need to communicate this information to the public.

In the context of this article, the term *risk* is defined as follows:

1. The possibility of suffering harm or loss; danger.
2. A factor, thing, element, or course involving uncertain danger; a hazard.[1]

We mean this definition to include the risk of an adverse health outcome, in particular from deployment-related exposures.

Federal and state agencies as well as the private sector have long struggled with how to communicate risk and environmental information to stakeholders. This challenge was extended to both the Department of Defense (DoD) and the Department of Veterans Affairs (VA) as soldiers returned from conflicts overseas in Vietnam, the Persian Gulf, and Afghanistan, among others, worried about environmental exposures and stressors encountered in these deployments.

Although the DoD and the VA both offer information about exposures of concern using various channels of communication (eg, face-to-face meeting with provider, veteran communication, fact sheets, letters mailed directly to exposed individuals, e-mailed messages to veterans, e-mailed notifications and remediation actions to health care providers, press releases), attempts to communicate the possible risks from these exposures have been met with skepticism on the part of many veterans and the public, likely fueled by media reporting and speculation regarding short- and long-term health effects.[2,3] The communication challenges have been many, including incomplete and limited exposure data, seeming delays in the release of information, limited high-quality research studies of suspected health effects, and concerns about the impact of multiple exposures.

A 1999 Institute of Medicine report noted that, "... Another critical juncture for dialogue about risks and health is between health care providers and service members after deployments. The extent to which health care providers listen to their patients' concerns and show understanding and responsiveness while sharing relevant information with them is important."[2]

A subsequent Institute of Medicine report titled "Protecting Those Who Serve; Strategies to Protect the Health of Deployed U.S. Forces" noted that the victory achieved in the first Gulf War (GW 1) had been "shadowed" by subsequent concerns about the long-term health status of those who served. They highlighted the role of the media in promulgating unproven hypotheses of various constituencies, including veterans, that unidentified, deployment-related exposures had led to chronic, medically unexplained illnesses.[3] The committee implied that the response to growing concerns about exposures and health impacts may have been suboptimal and contributed to a lack of trust and perhaps insufficient or untimely scientific study of the concerns.

Given this context, the committee acknowledged that the use of a risk-communication paradigm would be a better process for addressing deployment health concerns. The report noted that, "Risk communication should be framed as a dynamic process that is responsive to input from several sources, changing concerns of affected populations, modifications in scientific risk evidence, and newly identified needs for communication."[3] It also emphasized the need for training in risk communication for commanders, medical officers, and health care providers, along with periodic evaluation of the training programs. Finally, that report also called for greater stakeholder engagement in the development of a risk communication plan for when new concerns arise, including service members, their families, and community representatives.[3]

Over the last 10 to 15 years, there have been calls for a focus on risk communication by the DoD and VA.

> "Risk communication after a deployment is a crucial component of the appropriate care and support for the service member upon his or her return. Health concerns and health problems are almost certain given the experiences of previous

From the VA War Related Illness and Injury Study Center (Drs Santos, Helmer, and Teichman), East Orange, NJ; University of Medicine and Dentistry of New Jersey, School of Public Health (Dr Santos), Piscataway, NJ; Baylor College of Medicine (Dr Helmer), Houston, Tex; and Teichman Occupational Health Associates (Dr Teichman), West Orange, NJ.

Author Santos and coauthors have no relationships/conditions/circumstances that present potential conflict of interest.

The JOEM Editorial Board and planners have no financial interest related to this research.

Address correspondence to: Susan L. Santos, PhD, MS, 29 Welgate Road, Medford, MA 02155 mail to: ssantos.focusgroup@comcast.net

DOI: 10.1097/JOM.0b013e31824fe11e

> major deployments, and deployed forces will need information to understand them. As discussed in the 'Comprehensive Risk Communication Plan for Gulf War Veterans,' risk communication will be successful only to the extent that trust and credibility are present. Thus, efforts at risk communication must be part of an overall effort to see that returning service members are treated with gratitude and provided with medical care and support services to ease their readjustment."[2]

There also has been a call for training in risk communication at all levels and greater emphasis on perceptions and concerns of service members (and veterans).[2] The Persian Gulf Veterans Coordinating Board also called for the VA to implement strategies to address medically unexplained symptoms and risk communication for providers and service members.[2]

Both the DoD and VA have recognized the importance of using a risk communication paradigm to communicate the potential for exposure and health risks. Health care providers and health educators serve as primary channels of communication with veterans but may not understand the importance and benefits of risk communication to better inform and empower veterans about actions to take or not take to improve the quality of their health.

WHAT IS RISK COMMUNICATION?

In 1989, the National Research Council conducted an extensive study of the communication of risk-related information and defined risk communication as follows:

"Risk communication is an interactive process of exchange of information and opinions among individuals, groups, and institutions, concerning a risk or potential risk to human health or the environment. It involves multiple messages about the nature of risk and other messages not strictly about risk that express concerns, opinions, or reactions to risk messages or to legal and institutional arrangements for risk management."[4]

On a practical level, risk communication is needed when there is (1) complex health– or risk-related information being communicated; (2) a high level of concern; (3) expert disagreement or high uncertainty; and (4) low trust in those seen as responsible for the risk or for providing protection against a risk.

Many providers, along with scientists and other so-called experts, assume that risk communication simply involves providing information about health or environmental risks. This approach assumes communication is essentially a one-way process, where communication flows from a source of information (eg, the VA or primary care provider) to a receiver (veteran, patient, family member, etc). In a one-way model of communication, physicians, scientists, and officials have historically assumed that rejection of their message was due to a lack of understanding on the part of the recipient, as opposed to differing perceptions of the risk, or because of a fundamental disagreement with the message.

Consistent with the definition, risk communication must be reciprocal or "two-way" whereby an exchange of information occurs between source and receiver and both parties in the communication are engaged in a process of reciprocal disclosure and oftentimes more collaborative decision-making. In reality, risk communication takes place in a complicated environment involving a variety of stakeholders and communicators and covers a spectrum of risk definitions and messages.[5] For example, a veteran may find information about a possible exposure or health risk on the Internet or through the media or may receive it from family members or friends. That information then becomes part of the knowledge and beliefs he or she brings into the health care encounter. Thus providers are not communicating in a vacuum.

Risk Communication in the Health Care Encounter

Communication about risk- or health-related information can take many forms involving a variety of messages and goals. Goals can include increasing awareness, informing and educating, changing behavior, building consensus, or fostering collaborative decision making. The need to apply risk communication principles and techniques, however, can vary and occurs along a continuum. Not every communication between a provider and patient does or needs to attend to risk communication principles. For example, sometimes the risk information to be communicated is well understood and the method of treatment or management also has been well elucidated and is not in question. Everyday examples include communicating about the risks and management of hypertension or asthma. When the risks are sudden and potentially catastrophic or not well understood, however, or there is disagreement about the extent of the risk or how best to address it, then communication can become more difficult and risk communication is the appropriate paradigm to use. For example, listening to veterans is an important part of any clinical encounter and even more so when veterans have health concerns about potential exposures during deployments. Effective risk communication in the health care setting has been shown to increase patient understanding and recall of knowledge, influence medical decision-making, increase adherence to therapy/follow-up recommendations, increase patient satisfaction, and ultimately improve clinical outcomes.[6] Hampton et al[7] found that 75% of the information that led to a patient's diagnosis came from the interview with the patient—not the medical examination or laboratory tests taken to rule out or confirm a diagnosis. Recognizing the importance of patient perceptions, risk communication has been integrated into a number of health promotion and primary prevention efforts.[8] Thus, good communication and—as this article will explore-–risk communication are important parts of quality clinical care.

Risk Communication and Responding to Exposure Concerns of Veterans

Concerns about deployment-related exposures have been documented during and after numerous deployments ranging from exposure to mustard gas or blistering agents in World Wars I and II to Agent Orange in Vietnam and, more recently, concerns over exposure to depleted uranium (DU) and burning trash and feces in Iraq and Afghanistan.

A survey of GW 1 veterans by Schneiderman et al[9] identified a number of exposure concerns ranging from using protective equipment; hearing chemical alarms; exposure to diesel fuel and kerosene, smoke from oil well fires and burning trash and feces; and consuming local food to exposure to pesticides, repellants, paints, and solvents, among others.

Veterans from the current conflicts in Iraq and Afghanistan also have substantial concerns about deployment-related exposures–especially after deployment, as evidenced by results of the Post-Deployment Health Assessment and Post-Deployment Health Reassessment. Service members mark all exposure concerns from a list provided on the form. The Post-Deployment Health Assessment is self-administered by service members upon return from deployment, whereas the Post-Deployment Health Reassessment is self-administered 3 to 6 months later. Completion of these forms is mandatory for those still in the military and those still within the Guard and Reserve. Nevertheless, those who have separated from the military by the 3- to 6-month mark are not obligated to complete the form.

As seen in Table 1, prior to being deployed, neither active duty soldiers nor reservists had exposure concerns regarding their deployment, but immediately upon return, concern rises. Both active and reserve component members were still more likely to report exposure concerns 3 to 6 months later on their Post-Deployment

TABLE 1. Percentage of Veterans of Operation Enduring Freedom/Operation Iraqi Freedom Service Members Who Endorsed Exposure Concerns on PDHA and PDHRA

		Active Component		Reserve Component	
		n	%	*n*	%
09/2007–10/2008	Predeployment	245,378	0.0	85,843	0.0
	Postdeployment	244,511	16.2	75,174	24.9
	Reassessment	189,933	21.2	96,886	34.8
10/2009–09/2010	Predeployment	263,705	0.0	93,986	0.0
	Postdeployment	243,851	18.1	99,173	31.4
	Reassessment	211,446	20.0	96,675	32.1

PDHA, Post-Deployment Health Assessment; PDHRA, Post-Deployment Health Reassessment.

With permission from Armed Forces Health Surveillance Center, Medical Surveillance Monthly Report, 2008;15:28, and 2010;17:15.

Health Reassessment compared with their Post-Deployment Health Assessment at the time of return from deployment. Thus perceptions of health risk associated with exposures seem to shift over time. Those deployed from the army's active and reserve components were also more likely than their respective counterparts to report health and exposure concerns.[10,11]

A review of concerns from the first 612 clinical visits of veterans of Operation Enduring Freedom and Operation Iraqi Freedom to the War Related Illness and Injury Study Center in East Orange, New Jersey, indicate many similar exposure concerns, ranging from exposure to smoke from burning trash and feces to sand and dust storms, gasoline, jet and diesel fuel, and DU, among others. This information is consistent with qualitative information from a series of focus groups with GW 1 and Operation Enduring Freedom/Operation Iraqi Freedom veterans conducted as part of a pilot study to explore veterans' risk perceptions. Those results suggest that "sensory cues"—be they visible, audible, or tactile—are the primary evidence to veterans that exposure has occurred and provide a means of determining the magnitude and risk associated with the exposure (Santos and Helmer, unpublished data). For example, veterans noted a number of sensory cues including hearing chemical alarms go off, being exposed to soot and smoke from the oil fires so dense that they could not "see the hand in front of my face," or smelling burning trash and waste that made them "sick to my stomach." These short-term and profound sensory effects are further viewed as evidence of longer-term heath consequences. The importance of sensory cues as drivers of concern is consistent with the exposure concerns discussed earlier.

Results of focus groups also suggest that, in the case of GW 1 veterans, protective measures such as donning military-oriented protective posture (so-called "MOPP gear") or hearing an alarm go off and donning a mask were perceived as evidence that exposure had occurred rather than a measure to limit or prevent exposure. This raises implications for preventative health and industrial hygiene measures for at least some situations.

THE IMPORTANCE OF RISK PERCEPTION IN COMMUNICATING ABOUT RISK

Effective risk communication requires an adequate understanding of the target audience's perceptions, concerns, beliefs, knowledge level, and information needs. Understanding these factors allows all parties to engage in collaborative and patient-centered decision making and can identify areas where there are differences in understanding or interpretation and identify areas where more study or communication is needed.

In the specific case of heath risk communication, there is often a recommended behavior to optimize health (eg, stop smoking, lower alcohol consumption, perform screening for diseases). If there is a discrepancy between current behaviors and optimal behaviors, highlighting this discrepancy may help to motivate the patient to reconsider current behaviors. Further understanding of the patient's incentives and barriers to achieving the optimal, recommended behavior is critical. In fact, tools such as motivational interviewing acknowledge that the patient is key to making decisions about their own health and the provider's role is not to mandate or judge but to assist in collaborative decision making. A discussion of these factors may lead to the development of effective strategies for improving behaviors while addressing patient needs and concerns.[12] Changes in risk perception can prompt subsequent changes in risk behavior, which may include information seeking, initiation of behavior change, or risk avoidance.[13]

Discussions about risk often take place in a complex context. The Social Amplification of Risk Theory[14] emphasizes the context in which risk events/messages occur. Risk events are thought to interact with psychological, social, institutional, and cultural processes in ways that amplify or attenuate the perception of risk and risk behavior. These amplified behavioral responses generate secondary economic, political, social responses. Secondary impacts are further amplified and produce "ripple" effects.

After the GW 1, concerns about the potential for health effects from deployment-related exposures, cases and clusters of seemingly unexplained symptoms, and the responses from the relevant institutions provided a quintessential example of an amplified risk event. Countless media reports and growing concerns and requests for help by individual veterans led to a call to action by veteran groups and political leaders for further studies to determine the potential cause of those health effects. In part, the seeming lack of responsiveness to these calls may have led to concerns about the trustworthiness of both the DoD and VA. In such an environment, trust between the communicating parties is as critical as the content itself. Perceived inconsistencies about whether there had been attacks with chemical weapons and whether troops had been exposed and perceived delays in the release of such data further complicated communication by reducing trust in the sources of information and likely led to an increase in perception of risk. Although it was important for the DoD and VA to conduct research into possible causes of the symptoms and health concerns expressed, the social and political response likely influenced the magnitude and focus of research efforts as much as established scientific theory or empiric evidence. Such a response is consistent with the social amplification of risk model, which does not inherently place a value judgment on the response to risk. Ideally, needed study (of health concerns and possible causes) would occur even in the absence of such a response and taking a proactive approach, which includes open dialogue and communication, might lead to an increase in trust.

Cognitive psychology has identified factors that influence how people process information and, specifically, how the mental shortcuts or heuristics people use influence their perception of risk and understanding and processing of scientific or technical information. According to the availability heuristic, people tend to judge events that are easily recalled as more risky than events not readily available to their memory.[15–17] Events that have occurred recently or receive high media attention are more available. Repetitive reporting of an event such as contaminated water at Camp Lejeune or the Balad burn pits would trigger the availability bias. Another heuristic or bias that providers may encounter is the confirmation bias whereby people filter new information to fit previously formed views and beliefs.[15] New information that supports existing views is seen as more reliable and therefore more readily accepted than information

that is contrary to current views or beliefs. When discussing risk- and exposure-related information with veterans, providers need to be aware of preexisting views about the risk or health concern. Furthermore, the more strongly held a view is, the more difficult it will be to change even in the face of what may be considered scientific or "convincing" evidence.[15] Assessment and explicit acknowledgement of a veteran's potential beliefs are critical to successful communication. An individual may be more willing to listen to new information and other points of view after their own concerns have been acknowledged and validated.[18]

Research in risk communication provides insight into how perceptions of risk are shaped and that the public often has a different perception of risk from that of the so-called experts. Furthermore, these subjective or individually perceived perceptions of risks may be significantly more important in determining behaviors than scientific or medically based assessments of risk.[19] Risk perception is multidimensional, representing a confluence of values and attitudes in addition to verifiable facts. Individuals' perceptions are influenced by their emotional state, values, and life experiences. These shape how an individual will take in and process risk-related information.

For example, there is a rich literature examining the differences between "expert" and "lay" perceptions of risk.[20,21] Studies have illustrated the effect that gender, professional affiliation, and race have on perception of risk.[22] Women have been found to perceive higher risk than men, on average. Researchers have identified and classified a number of characteristics or attributes of a risk that affect perception of "riskiness." This difference in personal evaluation affects the likelihood that risk messages will be received.[23] Simply providing factual information or data will not shift or "correct" someone's perceptions. As described later, researchers in risk perception have identified a number of factors or characteristics of an event that influence how "risky" someone is likely to judge it.[22,24] There is also research that suggests affect is an important determinant of both risk perception and subsequent behavior about the risk event. Slovic et al[25] define affect as a quality of perceived goodness or badness, "(1) experienced as a feeling state (with or without consciousness), (2) demarcating a positive or negative quality of a stimulus. Affective responses occur rapidly and automatically." A person's reliance on this so-called affect heuristic becomes a short cut for risk perceptions and decision making about complex issues.[26,27]

When communicating about deployment-related health risks, it is important to recognize that these responses to risk are not misperceptions but rather differing perceptions. An important part of understanding veterans' exposure-related concerns and conducting a deployment-related exposure assessment is identifying what risk perception factors are present and how they need to be addressed as part of the exposure assessment and communication about the potential for health consequences. A discussion of the primary risk perception characteristics of importance in communicating exposure concerns follows.

Voluntary or Involuntary

Risks that are voluntary are usually perceived by the public as less serious or dangerous than those that seem to be involuntary, regardless of the actual hazard. This explains why voluntary risks (such as smoking or sunbathing) are perceived as being less risky than perceived involuntary risks such as exposure to second-hand smoke or contaminated air or water. Although servicemen and women voluntarily join the military and go to war expecting to face a number of risks, environmental exposures such as soot and smoke from burning trash or oil well fires or even receiving prophylactic medications or vaccines are often viewed as being involuntary risks and, as such, are perceived as being a higher risk. For example, focus-group results illustrated that being required to receive multiple vaccinations—in particular the anthrax vaccine—was perceived as being an involuntary risk, thus increasing the perception of risk. In the case of a veteran, this perception may be more pronounced upon return from a deployment or separation from service. Veterans often talk about how they risk their lives for their country (voluntary) and express frustration and concern when it seems that health care providers or government agencies are not concerned about the "involuntary" environmental risks they faced.

Controlled by the System or the Individual

People view risks that they do not have control over as more threatening than those that they can control, regardless of the actual hazard. Although this is related to the issue of voluntariness, control is a separate factor. When a soldier is deployed to a combat zone there are many risks that may be outside the individuals' control. Soldiers train for and anticipate these risks and have measures to mange (control) them, whether they be the threat of gunfire or risks from improvised explosive devices. Deployment-related environmental exposures are also often not viewed as being within the individuals' control. Soldiers may also believe they did not always have the training or techniques to control them. As a result, many of these environmental exposures become of concern to veterans or those recently returned from deployments.

For example, exposure to burning trash and feces and poor air quality is not under the control of the individual (note it is also considered an involuntary risk). Although theoretically the service member has some limited control to reduce exposure (eg, use a handkerchief over their nose), it will not likely alter the perception that the exposure is outside their control. Furthermore, if information regarding what hazardous constituents might be in the air is requested but not made available, it serves to reinforce that the control and management of subsequent risks is controlled by "the system." Similarly, comparing risks that are perceived as within their control and voluntary (eg, smoking, alcohol consumption) with the possible risks from deployment-related exposures that are perceived as not having been in their control can heighten risk perception and concern.

Thus, it is important to provide information and education about the risks of concern including what is known, what is not, and the ways in which the risk is or can be controlled. Having access to such information serves to increase one's sense of control. Ideally this would occur prior to the exposure, but even if this has not occurred, providing information after the fact is still important, as is telling someone where else they can go for further answers to their questions or concerns. When conducting an environmental exposure assessment, shared control can be obtained by the physician negotiating a shared agenda with the veteran including eliciting the top concerns the veteran has and what he or she would like to accomplish. It can also occur by acknowledging information sources the veteran wishes to share that might impact their perceptions of risk or providing information to the veteran about relevant studies or information.

Exotic or Familiar

Risks that are perceived as unfamiliar or exotic are seen as more risky than risks with which we are familiar. Toxic pollutants, with their long names such as sodium dichromate, trichloroethylene, and volatile organic compounds, can certainly seem exotic. Furthermore, the use of units of measurements that are also unfamiliar such as parts per billion or μg/L add to the exotic nature of the risk. Conversely, sometimes familiarity can make people judge the risk as less serious. For example, many people do not worry about the risks of getting sick with the "flu" (influenza)—it is a familiar risk. When communicating the risks of the recent H1N1 pandemic, health communicators struggled with this phenomenon when trying to get people to take the risks seriously. Conversely, people were more concerned about getting the H1N1 vaccine because it was perceived as being new and exotic. Those communicating health- or

risk-related information should be careful not to compare risks that are perceived as exotic, for example, comparing trichloroethylene with a more common risk such as a household cleaner, because it will tend to increase public perception of the risk and could result in a loss of trust. Concern about health risks from exposure to burning trash has been an issue at least as far back as Vietnam and remains a concern among recently separated servicemen and servicewomen and a growing number of veterans. Although the use of uncontrolled burning as a means of disposing of waste may be common in many parts of the world, it is certainly not a familiar practice in the United States, having been regulated as a result of health risks. Thus it makes sense that this exposure would have a higher perception of risk.

Dreaded or Not Dreaded

Risks that are dreaded seem more serious than those that carry less dread. Researchers have identified that the dread factor is actually a cluster of risk-perception characteristics. The dread factor is related to a risk that is hard to prevent, is not within the individual's control, and has catastrophic or fatal consequences.[27] Chemicals that are carcinogens or anything associated with radiation are perceived as dreaded substances and therefore perceived as being a higher risk. It is important that communicators recognize and acknowledge this dread. Veterans with deployment-related exposure concerns may experience this dread effect with respect to the use of biological weapons and their potential for health effects. The dread factor also seems to be influencing perceptions of exposure to DU. Depleted uranium is about 40% less radioactive than naturally occurring uranium (which is a weakly radioactive substance), and traces of uranium occurring naturally in food, soil, water, and even the human body.[28–30] Yet many veterans perceive exposure to DU as presenting a high risk because they react to the presence of radiation—a dreaded substance. To respond to this dread factor, providers need to acknowledge the dread concern as legitimate before further assessing actual exposure risk and providing recommendations for next steps (based on current scientific evidence) by saying, for example, "I recognize that you hear the word *uranium* and you must worry about exposure to radiation. That's understandable. What I can tell you is that . . . ." Saying it this way acknowledges the dread and removes a barrier to the individual being able to process subsequent medical and scientific information.

If instead the provider were to say, "You shouldn't worry about DU because it's weakly radioactive," or, "Don't worry about DU because traces of uranium occur naturally," those statements might have the unwanted effect of increasing dread, heightening the difference in perception of a natural versus artificial substance, increasing or reinforcing perception of risk, and reducing trust. Any subsequent attempt to further characterize actual exposure risk would likely not overcome the loss of trust and credibility caused by those devaluing statements.

Certainty or Uncertainty

Risks that are thought to be more certain or better understood are often perceived by the public to be less serious (and more acceptable) than those that are not. Conversely, risks about which scientists are uncertain are considered far more serious. In these cases, people with concerns (veterans) want those investigating or managing the risk to err on the side of caution or health protection. Risk communication efforts must acknowledge points of uncertainty but be careful not to overwhelm people by pointing out all the uncertainty associated with the potential for exposure or health risks. When experts disagree or scientific information changes over time, uncertainty and veteran/public perception of risk may increase. Addressing concerns about uncertainty or expert disagreements is a key part of addressing risk perception. Uncertainty—and how or whether the government is doing enough to reduce it—is often a major concern of veterans. Uncertainty includes whether veterans were or were not exposed to biological weapons when they heard alarms go off, whether exposure to burn pits does or does not pose a risk, and whether symptoms veterans experience currently can be attributed to a previous exposure or not. Lack of real-time exposure data, inability to understand the potential impacts from exposure to mixtures of chemicals and compounds, and the role that stress and harsh conditions may play are but a few of the uncertainties that may end up increasing perception of risk and concern.

When communicating uncertainty as part of an exposure assessment, it is useful to bound it in terms of what is not known as well as what is known. It is also important to let people know where they can get more information, including what further studies are being done to reduce uncertainty. The use of so-called negative language can also increase perception of uncertainty and risk. For example, a report by the Institute of Medicine noted that " . . . there is inadequate/insufficient evidence to determine whether an association does or does not exist between anthrax vaccination and long-term adverse health effects."[31] This type of statement is not easily understandable to those without medical or scientific training and could increase perception of risk. Thus it is the responsibility of the provider to place such information in context.

Media Attention Versus Lack of Media Attention

There has been enormous media attention over the years regarding environmental health risks in general as well as deployment-related health risks. Opinion polls of Americans also show a fairly consistent concern for the environment and risks to human health from environmental exposures. Recent popular books and movies ranging from *A Civil Action* to *Erin Brockovich* show tensions between companies and government agencies on the one hand and concerned citizens on the other. Concerned individuals may try to demonstrate the relationship between adverse health effects and disease and exposures to toxic substances in the air and water by using visual images and words that reinforce so-called sensory cues of exposure or trigger risk perception factors thereby heightening the perception of risk. Media attention makes possible exposure-related risks more memorable, further increasing perception of risk. For example, there was a high degree of media attention about illness possibly associated with serving in the GW 1 that hypothesized causes of the health problems. More recently, there has been media attention as well as attention from social media outlets such as Facebook and Twitter over exposure to burn pits and contaminated drinking water at military bases. All of this attention serves to keep a risk in the public eye and may serve to increase dread and uncertainty about the potential for health effects. If a veteran notes to a provider that they have received information from the Internet or media sources, it is critical to acknowledge that the issue has received media attention and to review that information with the veteran for accuracy and relevance instead of discounting it. Explaining how to review information about scientific research studies, epidemiologic studies, case reports, and anecdotal information is a part of integrating health education and risk communication into an exposure assessment.

Naturally Occurring Versus Human Origin

Substances that are naturally occurring are viewed as less risky than those that are of human origin. Many Americans will take so-called natural supplements and think nothing of the potential for health effects simply because they are labeled "natural"—regardless of whether there is evidence of their potential benefits or risks. The risks from flooding or earthquakes in an area prone to these natural events are often underestimated. Similarly, environmental risks that are perceived as natural such as indoor radon are perceived as less risky than that from a man-made substance such as DU or low levels of cesium from a former nuclear processing facility. Comparing risks that are naturally occurring with those that are perceived as

man-made will tend to increase perception of risk and may also result in a loss of trust in the communicator. As described earlier, DU is a "dreaded" substance because of people's perception of anything related to radiation and radioactivity. Simply stating that uranium is a naturally occurring substance does little if anything to reduce this perception of risk and may in fact increase concern or be seen as dismissing the risk. Conversely, the US Environmental Protection Agency has extensively studied how to communicate the risk of exposure to radon in part because the public tends to underestimate the risk of this naturally occurring substance.

Benefits Understood Versus Benefits Unclear

There has been much research on whether and to what extent providing information of the benefits of an activity can ameliorate the associated perceived risks. In general, it is thought that if the risks and benefits are understood, perception of risk will be lessened. When considering this risk perception factor, it is important to note that the risks and benefits must go to the same entity. For example, telling community residents that a low-level radioactive waste disposal site should be located in their community because there is a societal need and benefit from doing so does little to lesson concerns that the individuals are the ones who might be subject to potential risks. On the contrary, individuals decide all the time to subject themselves to the risk of certain medications or medical procedures because they perceive that there is a direct benefit to their doing so and that the benefits outweigh the risks. In a command and control culture there can be a tendency to not provide all the rationale for service members having to take certain actions such as receiving multiple vaccinations before a deployment or taking medications in areas of the world where exposure to infectious agents may occur. Providing information about the benefits can, however, reduce perception of risk and lead to more collaborative decision making.

Trust and Credibility

Many of the other characteristics that affect perception of risk are inherent to the risk itself. The characteristics of trust and credibility are related to the source of the risk, or the entity seemingly responsible for creating, controlling, or mitigating the risk. The issue of trust is one of importance, having impacts on perception of risk, and much work has been done in this area. If the individual or organization communicating the risk information or seen as responsible for the risk is not trusted, perception of the risk will be increased. Conversely, the more trustworthy the source is, the lower the perception of risk. As noted in the "Comprehensive Risk Communication Plan for Gulf War Veterans,"[2] risk communication will be successful only to the extent that trust and credibility are present.

The importance of how trust and credibility of providers or other experts whose responsibility it is to assess or communicate exposure-related information is clearly important to improving communication of deployment-related health risks and, in particular, exposure concerns. Petty and Cacciopo[32] note that trust can be established along either a "central" route of consciously evaluating the source's trustworthiness, or along a "peripheral" route of responding to various cues about the source. Much attention has been given to the criteria by which people make a "central" judgment of trust. This attention has given rise to a number of different sets of trust dimensions: competence and fiduciary responsibility[33]; competence, objectivity, fairness, consistency, and faith[34]; commitment, competence, caring, and predictability[35]; knowledge and accountability and vested interest[36]; empathy and caring, honesty and openness, knowledge and competence, and commitment and dedication[37]; a strong affective factor (comprising highly correlated judgments of openness, reliability, honesty, credibility, fairness, and caring) and a weaker competence factor[38]; commitment, competence, caring, predictability, and openness[39]; general trust and skepticism[40]; and expertise and trustworthiness.[41] There are some researchers who deemphasize cognitive and rational processes and stress the importance of "peripheral" trust building, which may come about through shared values.[42–44] It is clear from all the research that what makes someone a trusted source of information goes beyond technical expertise or competence and that trust and credibility of the communicator and institution are important in communicating health risks and addressing risk perception issues.

APPLYING RISK COMMUNICATION TO THE CLINICAL ENCOUNTER IN ADDRESSING EXPOSURE CONCERNS

Although risk communication tools and techniques are often effective in addressing issues of real and perceived risks between organizations and groups of individuals, the same concepts can and should be applied during interactions between an expert and an individual, such as in the doctor's office or when discussing exposure concerns. Most patients inherently trust the health care provider whom they seek to provide care, treatment, and information. Nevertheless, if and when a provider fails to recognize and acknowledge his or her patient's perceptions and risk concerns (by not attending to basic risk communication principles), the trust and credibility of that relationship may be strained or lost. Federally employed health care providers share a duality of trust: individual providers are often highly trusted but the organization for which they work (eg, the DoD, the VA) may not be perceived as trustworthy. The use of risk communication techniques can optimize the clinical interaction between a provider and patient when concerns are high, trust is low, and uncertainties abound. Risk communication can improve education and information sharing and foster behavior change that is most consistent with improving the health of their patients. Employing risk communication skills can also promote expert/provider and patient satisfaction with the encounter and may improve adherence to recommendations.

The first critical step in any clinical encounter is to establish trust and credibility in the relationship. Showing empathy and caring regarding a veteran's health and exposure concerns at the start of the exposure assessment or other clinical encounter is important. This can be done by asking questions, active or reflective listening whereby the provider paraphrases what the veteran/patient has told them without inserting the provider's own point of view, and establishing an agreed-upon agenda for the visit. Empathy and caring is also established or influenced by body language. Although the importance and meaning of body language does vary according to cultures, there are some more universal examples. Lack of eye contact is often cited by patients as a perceived sign of contempt or disinterest by the provider. With more emphasis on entering patient information directly onto tablets or computers, this could inadvertently result in less eye contact, whereas facing the patient can promote a perception of openness and interest.

Being sensitive to one's first impression and quickly adjusting to accommodate the patient's perception is essential to effective risk communication. A provider who is not sensitive to this first impression can still succeed, but especially if the discussion includes a subject of disagreement, high uncertainty, or perceived high concerns, establishing good rapport from the start can promote success.

Part of identifying and understanding the veteran's concern includes eliciting the patient's knowledge, beliefs, and attitudes. This is the second critical step when applying risk communication to conducting an exposure assessment or addressing exposure-related concerns. This serves two purposes. First, it demonstrates the respect for the person and his or her concerns and ideas. Second, it provides more detailed knowledge of the risk perception factors that are relevant to the conversation. Taking the time to explore the knowledge base of the individual through questions such as, "Tell me what you know about this

exposure" or "What have you heard about this exposure?" often gets the person to open up and describe not just their knowledge, but also their fears, concerns, and beliefs. Using probing follow-up questions, such as, "Tell me more about why you're so concerned," "What do you think is going on?," or "Have you had any other related experiences?" may elicit specific examples of the risk perception factors. This information can be incorporated in real time into the strategy for having a discourse with the patient regarding actions that will promote wellness and optimize his or her health.

Honesty and openness are key parts of establishing trust and credibility. These attributes can be demonstrated by acknowledging what is known and not known about the relationship of an exposure to short- or longer-term health effects, lack of data on exposure levels, or incompleteness of scientific information, and others. Honesty can also be demonstrated by acknowledging if there was anything that should have been done differently or acknowledging "mistakes." Finally, being willing to follow up or provide next steps in terms of information or what the veteran can do to improve the quality of their health and life or what the provider can do are ways to demonstrate commitment and dedication and increase trust and credibility.

Only after establishing trust and credibility, assessing the patient's perception of risk, understanding their concerns, and ensuring a dialogue has been established should the provider or expert attempt to fill in the patient's gaps in knowledge with factual information or offer more accurate information. Because providing this data alone will not "fix" someone's perceptions of risk, it is important to partner with the individual to shift his or her perceptions and better align them to generally accepted medical beliefs or scientific findings. Explaining why you believe what you believe and making information and decision making more transparent can both foster trust and facilitate the processing of technical or controversial information. Because the content of the discussion obviously will depend on the concern of interest, it is difficult to generalize more about this step of the risk communication process. The expert should take the time to elicit indications of understanding from the patient while assessing both the attention to and immediate recall of the information as well as the possible shift in perception or understanding induced by the conversation.

The penultimate step is to negotiate jointly the goals and action plan. Start with establishing individualized goals, such as increasing the certainty of the exposure or the certainty of the presence or absence of a health effect. The patient should own the goals, although the provider may need to help the patient to articulate them in a realistic format. The plan may be simply to observe and revisit the issue only if the concern is raised by the patient again in the future. It could require additional research by the provider or additional information from the patient. Once again, it is difficult to generalize due to the specific characteristics of individual concerns, but some key attributes for the expert to demonstrate in the conversation include respecting differences of opinion and acknowledging limitations in his or her ability to meet unrealistic expectations (eg, irresponsibly expensive, irrelevant, or unwarranted dangerous testing).

Following up in terms of information about what the veteran can do to improve the quality of their health and life is the most important thing a provider can do to demonstrate commitment and dedication and increase trust and credibility. Following up and showing commitment and dedication are the final steps of the risk communication exchange. This is what will make the goals and action plan real and valued for the veteran/patient.

SUMMARY

As providers discuss the issues raised in this special issue, the importance of risk communication becomes paramount. Although our knowledge about environmental exposures and the potential for health effects continues to evolve, the importance of communicating effectively what we know and do not know increases. Studies show that when risk communication techniques are employed, improved outcomes, such as greater patient–provider satisfaction, better adherence to treatment recommendations, and more collaborative decision making also occur. In this age of information availability and overload, veterans and their family members have many sources of information at their disposal. Unfortunately, not all the information that is easily accessible has scientific merit. Conversely, assuming that a veteran will simply "take your word for it" is not sufficient. Structuring discussions about exposure concerns within a risk communication paradigm sets the stage for providers to listen better to their patients' perspectives and obtain information critical to conducting a thorough exposure assessment. Empowering veterans with information that addresses their concerns and reflects what we know about risk perception and what we do and do not know about possible health risks will set the stage for meaningful communication and empower veterans to better manage their health.

ACKNOWLEDGMENTS

This material is the result of work supported with resources and the use of facilities at the War Related Illness and Injury Study Center, Department of Veterans Affairs, New Jersey Health Care System. The views expressed are those of the authors and do not reflect the official policy or position of the US Government.

REFERENCES

1. American Heritage Dictionary of the English Language. http://www.ahdictionary.com/word/search.html?q=risk. Accessed March 20, 2012.
2. Institute of Medicine. *Strategies to Protect the Health of Deployed U.S. Forces: Medical Surveillance, Record Keeping, and Risk Reduction*. Institute of Medicine; Washington, DC: DC National Academy Press; 1999.
3. Institute of Medicine. *Protecting Those Who Serve; Strategies to Protect the Health of Deployed U.S. Forces*. Washington, DC: DC National Academy Press; 2000.
4. National Research Council. *Improving Risk Communication: National Research Council*. Washington, DC: DC National Academy Press; 1989.
5. McCallum DB, Santos SL. Comparative risk analysis for priority setting. *Hum Ecol Risk Assess*. 1997;3:1215–1234.
6. Kaplan SH, Greenfield S, Ware JE, Jr. Assessing the effects of physician-patient interactions on the outcomes of chronic disease. *Med Care*. 1989;27(suppl):S110–S127.
7. Hampton JR, Harrison MJ, Mitchell JR, et al. Relative contributions of history-taking, physical examination, and laboratory investigation to diagnosis and management of medical outpatients. *Br Med J*. 1975;2:486–489.
8. Frosch DL, Kaplan RM. Shared decision making in clinical medicine: past research and future directions. *Am J Prev Med*. 1999;17:285–294.
9. Schneiderman A, Lincoln AE, Curbow B, et al. Variations in health communications needs among Veterans. *Am J Public Health*. 2004;94:2074–2076.
10. Armed Forces Health Surveillance Center. *Medical Surveillance Monthly Report (MSMR)*. 2008;15:28.
11. Armed Forces Health Surveillance Center. *Medical Surveillance Monthly Report (MSMR)*. 2010;17:15.
12. Witte K, Meyer G, Martell D. *Effective Health Risk Messages: A Theoretically-Based, Step-by-Step, How-To Guide on Developing Persuasive Communications That Work*. Newbury Park, CA: Sage; 2001.
13. Weinstein ND, Nicolich M. Correct and incorrect interpretations of correlations between risk perceptions and risk behaviors. *Health Psychol*. 1993;12:235–245.
14. Kasperson RE, Renn O, Slovic P, et al. The social amplification of risk. *Risk Anal*. 1988;8:177–187.
15. Copernicus InstituteKloprogge P, van der Sluijs J, Wardekker A. *Uncertainty Communication: Issues and Good Practice. Version 2.0*. Utrecht, The Netherlands: Copernicus Institute for Sustainable Development and Innovation; 2007. http://www.nusap.net/downloads/reports/uncertainty_communication.pdf. Accessed March 15, 2011.
16. Slovic P, Fischhoff B, Lichtenstein S. Rating the risks. *Environment.* 1979;21:14–20.
17. Tversky A, Kahneman D. Judgment under uncertainty: heuristics and biases. *Science*. 1974;185:1124–1131.
18. Bier VM. On the state of the art: risk communication to decision-makers. *Reliab Eng Syst Safe*. 2001;71:151–157.

19. Nguyen TT, McPhee SJ, Stewart S, et al. Factors associated with Hepatitis B testing among Vietnamese Americans. *J Gen Intern Med.* 2010;25: 694–700.
20. Slovic PB, Fischhoff B, Lichtenstein S. Perceived risk: psychological factors and social implications. In:Warner F, Slater DH, eds. *The Assessment and Perception of Risk: A Discussion*. London, United Kingdom: Royal Society; 1981.
21. Slovic P, Fischhoff B, Lichtenstein S. Perceived risk: psychological factors and social implications. *Proc R Soc London*. 1981;376:17–34.
22. Flynn J, Slovic P, Mertz CK. Gender, race, and perception of environmental health risks. *Risk Anal*. 1994;14:1101–1108.
23. Santos SL, McCallum DB. Communicating to the public: using risk comparisons. *Hum Ecol Risk Assess*. 1997;3:1197–1214.
24. Slovic P. Perception of risk. *Science*. 1987;236:280–285.
25. Slovic P, Finucane M, Peters E, et al. Rational actors or rational fools: implications of the affect heuristic for behavioral economics. *J Socio-Econ*. 2002;31:329–342.
26. Slovic P, Finucane M, Peters E, et al. Risk as analysis and risk as feelings: some thoughts about affect, reason, risk, and rationality. *Risk Anal*. 2004;24: 1–12.
27. Dohle S, Keller C, Siegrist M. Examining the relationship between affect and implicit associations: implications for risk perception. *Risk Anal*. 2010;30:1116–1128.
28. Deployment Health Clinical Center. *Depleted Uranium Information for Clinicians* [fact sheet]. 2004. http://www.pdhealth.mil/downloads/DU_Clinicians_Guide_09172004.pdf.
29. US Environmental Protection Agency. *Depleted Uranium Technical Brief*. EPA Publication No. EPA 402-R-06–011. 2006. http://epa.gov/radiation/docs/cleanup/402-r-06-011.pdf. Accessed March 20, 2012.
30. RAND Corporation. *A Review of the Scientific Literature as it Pertains to Gulf War Illnesses: Volume 7 Depleted Uranium*. 1999. http://www.rand.org/content/dam/rand/pubs/monograph_reports/2005/MR1018.7.pdf.
31. Institute of Medicine. *Gulf War and Health: Volume 1: Depleted Uranium, Sarin, Pyridostigmine Bromide, and Vaccines*. Washington, DC: DC National Academy Press; 2000.
32. Petty RE, Cacioppo JT. *Communication and Persuasion: Central and Peripheral Routes to Attitude Change.* New York, NY: Springer-Verlag; 1986.
33. Barber B. *The Logic and Limits of Trust.* New Brunswick, NJ: Rutgers University Press; 1983.
34. Renn O, Levine D. Credibility and trust in risk communication. In: Kasperson RE, Stallen PJ, eds. *Communicating Risks to the Public.* Dordrecht, Boston, London: Kluwer Academic Publishers: Norwell, MA: 1991:175–217.
35. Kasperson RE, Golding D, Tuler S. Social Distrust as a factor in siting hazardous facilities and communicating risks. *J Soc Issues*. 1992;48:161–187.
36. Frewer LJ, Howard C, Hedderley D, et al. What determines trust in information about food-related risks? Underlying psychological constructs. *Risk Anal*. 1996;16:473–486.
37. Peters RG, Covello VT, McCallum DB. The determinants of trust and credibility in environmental risk communication: an empirical study. *Risk Anal*. 1997;17:43–54.
38. Metlay D. Institutional trust and confidence: a journey into a conceptual quagmire. In: Cvetkovich G, Löfstedt RE, eds. *Social Trust and the Management of Risk*. London, United Kingdom: Earthscan Publications; 1999:100–116.
39. Tuler S. *Radiation Risk Perception and Communication: A Case Study of the Fernald Environmental Management Project. SERI Report 02–001*. Greenfield, MA: Social and Environmental Research Institute; 2002.
40. Poortinga W, Pidgeon NF. Exploring the dimensionality of trust in risk regulation. *Risk Anal*. 2003;23:961–972.
41. Frewer LJ, Scholderer J, Bredahl L. Communicating about the risks and benefits of genetically modified foods: effects of different information strategies. *Risk Anal*. 2003;23:1117–1133.
42. Earle TC, Cvetkovich GC. *Social Trust: Toward a Cosmopolitan Society.* Westport, CT: Praeger; 1995.
43. Cvetkovich GT, Winter PL. *Social Trust and the Management of Threatened and Endangered Species: An Investigation of Communities of Interest and Communities of Place*. Bellingham, WA: Western Washington University; 2001.
44. Earle TC, Cvetkovich G. Social trust and culture in risk management. In: Cvetkovich G, Löfstedt RE, eds. *Social Trust and the Management of Risk*. London, United Kingdom: Earthscan Publications; 1999:9–21.

