

Risk Communication for Public Health Emergencies

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Abstract

This review defines crisis risk communication, traces its origins to a number of applied fields, and then shows how basic principles have become incorporated into emergency preparedness and risk communication for public health. Literature from four different disciplines that inform crisis risk communications are reviewed. These are (*a*) environmental risk communication, (*b*) disaster management, (*c*) health promotion and communication, and (*d*) media and communication studies. Current curricula and training materials are briefly reviewed. Although this literature review suggests much progress has been made to incorporate and disseminate crisis risk communication principles into public health practice, and case studies suggest that public health workers have gained skills and experience, this emerging field still lacks in-depth evaluation of the effectiveness of event-specific crisis risk communication efforts.

Crisis risk communication: accurate and effective communication to diverse audiences in emergency situations

Risk communication: Information exchange about health risks caused by environmental, industrial, or agricultural, processes, policies, or products among individuals, groups, and institutions

INTRODUCTION

Crisis and emergency risk communication, a function essential to public health agencies, has seen its fortunes rise precipitously post-9/11, as scenarios of terrorism and large-scale natural disasters threaten the physical and mental health of large groups of people (31, 40, 86, 92, 94). Since 2001, resources have enabled opportunities for research, practice, and training among legions of public health workers and academics who have looked for guidance to the applied disciplines in which risk communication and crisis management have flourished for decades. The objective of this chapter is to review the different research and practice disciplines that have influenced current theory and practice of crisis and emergency risk communication in public health. Crisis and risk communication in public health is similar to practices in other social and governmental agencies who communicate risk to workers and the public. It diverges mainly in content.

Success in this endeavor can be seen not only in the outpouring of books, articles, training guidelines, and coordinated tabletop emergency preparedness exercises that include risk communication components, but also in events that have encouraged public health agents to be more visible and effective in their new roles as first responders. Recent case examples of effective public risk communications include West Nile Virus, the SARS outbreak in 2003, and current avian and pandemic flu pre-crisis planning efforts. But much is still to be done and learned to assure effective emergency and crisis risk communication for public health (11, 70, 115). Since the well-documented anthrax risk communication debacle of 2001 (14, 16, 107, 110, 119, 128, 136, 142), public health and the applied field of disaster management have both experienced risk communication missteps, most notably the failed attempt in 2003 to inoculate a large group of health workers for smallpox (17, 125), the flu vaccine “shortages” in 2003 and 2004 (27, 126), and the failure in 2005

to evacuate New Orleans residents prior to flooding caused by Hurricane Katrina (20).

It is important to distinguish what crisis risk communication in public health is and what it is not. But first a distinction must be made between more general fields of risk communication and health promotion and communication in public health. Historically, risk communication, whether in a crisis or not, has focused on communication to workers and the public about industrial, medical, environmental, societal, or catastrophic risks and hazards that can potentially impact exposed populations, communities, or individuals (10, 11, 39, 80, 99, 114a). Agencies involved may include public health, but much of this work has been conducted through environmental, food, drug, and agricultural regulatory agencies (11, 32, 38, 78, 81a, 95). Objectives for organizations and agencies charged with overseeing these types of risks are to minimize and/or manage health impacts through engineering, mitigation, and health protection activities as well as through policy, legal, social, and behavioral adjustments for organizations and people affected (32, 111, 136a). Risk communication is a part of this process and entails both internal communication, for example, to exposed workers, and external communication, to the general public if they too are at risk for exposure. Risks in question are typically time bound, geographically specific, and relevant to some but not necessarily all populations (10, 78, 80, 92, 93, 98). Risk communication is a set of practices and relationships more generic than crisis risk communication, which presumes an emergency (23a, 31, 92, 93, 98, 114a).

In contrast, health promotion and communication have been concerned with ongoing risky and healthy behaviors of individuals, communities, and organizations, focusing on practices, programs, and policies to improve health status and reduce health disparities (57, 130, 150). Health promotion and communication have traditionally been less concerned with environmental and disaster-related risks than with health communication.

Because crisis risk communication skills of the public health workforce are now being addressed through training and outreach, many health promotion and communication competencies have been incorporated into current crisis risk communication practices.

A second distinction is within the risk communication field itself and this entails the difference between risk communication and crisis risk communication. Sandman (123, 124) delineates four types of risk communication on the basis of public perceptions of the hazard caused by the risk and on the degree to which the public is outraged about the risk (124). For low-outrage, high-hazard scenarios such as ongoing environmental degradation, risk communication is akin to public relations or health education: Audience engagement must be forced. Stakeholder relations occur in medium-hazard, medium-outrage conditions such as local environmental threats to families and households. A third type of risk communication involves a low-impact hazard that makes people upset, such as the Alar on Apples controversy of the 1980s. In this type of risk communication, the goal is to discredit the source of the risk information and reassure the public. Finally, we have crisis risk communication, where the hazard is high as is people's emotional response or outrage about it. For this type of scenario crisis risk communication must be timely, accurate, direct, and relevant, and it must also reassure and give people hope (23a, 72, 80, 92, 97, 114a, 124, 129).

Crisis risk communication therefore diverges from other forms of health communication in context as well as in intensity, and agencies with first responder roles have a responsibility to assure the accuracy and timeliness of messages, access to dissemination channels, engagement with the media, and evocation of compassionate attitudes toward populations at risk. Crisis conditions combine unexpectedness, high levels of threat, an aroused or stressed population, and media looking for breaking news stories (11, 50), all of which create a communication envi-

ronment that is inherently high risk and unstable. Risks of miscommunication in a crisis risk communication scenario are high, and the communication process must contain elements of trust, credibility, honesty, transparency, and accountability for the sources of information. Lack of trust and credibility can doom risk communication efforts (32a, 38, 80, 106, 114, 151).

In numerous case studies in crisis risk communication events, audiences have misinterpreted messages, warnings have failed to warn, false rumors have been generated, multiple sources have given inconsistent information, populations have not been reassured, and the media has sensationalized the story (50, 111, 119). However, crisis risk communication is essential for saving lives, assisting in search-and-rescue efforts, and ultimately plays a major role in disaster and crisis mitigation efforts (52, 93).

Almost all planned risk communication whether in response to new scientific findings, ongoing investigations, or unplanned emergency events occurs in organizational contexts (80, 99). Planned risk communications are typically embedded in institutional cultures with specific agendas and take place in the context of processes of risk assessment, risk intervention or management, and risk evaluation (62, 80, 111). In a non-crisis scenario, the risk communication component is dependent on these other risk management activities that inform what is said, when it is said, and to whom it is said (32, 43). In a crisis, risk assessment, mitigation, and evaluation activities are telescoped and sometimes truncated, the demand for information can overwhelm the ability of the system to deliver it, and the communication itself can become separated from the assessment and management processes that typically direct it (50, 115, 119).

Risk communication has been integral to disaster management for 50 years and to environmental public health since the late 1970s. Current crisis risk communication that enlists public health workers is an integrative discipline (23a, 114a, 115) with roots

in at least four areas of research and applied professional practice: (a) environmental risk communications, (b) disaster management, (c) health promotion and communication, (d) media and communication studies. A fifth discipline that also has contributed to the development of crisis risk communication is organizational crisis communications. This discipline was not reviewed here because of lack of space and expertise; however, interested readers can consult a good online bibliography (http://www.calpoliceimage.org/a.bibliography_of_crisis_managem.htm).

After a review of theories and research from these four disciplines, which have directly contributed to crisis risk communication, some practice guides and principles are explored.

THEORIES AND RESEARCH

Risk Communication

Research from the risk communication field draws heavily on social, cognitive, and economic psychology and their organizational and community-based applications. Research suggests people's responses to events that threaten their health and safety evoke a diverse array of emotional, cognitive, and behavioral responses (30, 39, 40, 42, 123). Risk perceptions, defined as the subjective assessment of risk, increase when the hazard is manmade, causes a dreaded disease or condition, is involuntary, is localized in one geographic area, is the source of disagreement among experts, is difficult to detect in regards to exposure, and is out of a person's control (39, 43). Toxic industrial leaks, radon gas, or contaminated food often meet these criteria. Other factors that increase perceptions of risk are actions that do not have a clear benefit, an untrusted source of risk information, and an agency responsible for risk management with a history of not caring (31, 99, 124). Higher risk perceptions can stimulate proactive behaviors but because there is an emotional aspect, they can create resistance to risk communication and

recommended actions (30, 39, 40, 41, 99, 123). When people are upset, angry, fearful, outraged, under high stress, involved in conflict, or feel high concern, they often have difficulty processing information, which is particularly important to consider when they receive crisis risk communication.

One aspect of this response is called mental noise theory (7, 31). This theory holds that when people are stressed, they are attending to a great deal of internal "mental noise" and are less able to attend to externally generated information (31). For bioterrorism or pandemic events, given the dread and uncertainty surrounding them, the likelihood is high that people will respond emotionally (30). A second tenet of crisis risk communication is that when people are upset they often do not trust authority (113, 114). Linked to this is an idea called trust determination, which means that when people are distressed they often become distrustful and are less likely to accept the validity of communications (106, 113, 114, 131). A third tenet, called negative dominance theory, holds that when people are upset they are more likely to listen to negative rather than positive reports, and they often give greater weight to negative than to positive information (31). Recent field experiments after 9/11 suggest that different types of emotional response also impact outlook: Those experiencing anger are generally more optimistic than are those experiencing fear and dread (77).

The translation of scientific knowledge into useful constructs or concepts that non-technical audiences can understand has long been a major preoccupation of the risk communication field (11, 32). However, faulty risk perceptions may also impede communications because people may misunderstand or misinterpret scientific or probabilistic information (132, 133, 140). When confronted with hazards in their environment, people apply a number of complex decision-making rules or heuristics to the rating of risk. For example, persons often misperceive probabilities, seriousness, or their own true risk (140). People tend to overrate the probability of rare,

serious events and underrate the probability of more common, but less serious events (133). People also have difficulty understanding cumulative risk (59) and cannot always understand risk if framed in alternative ways. Yet it is perceptions of risk, not actual risk, that determine how people respond to hazards. Thus risk perceptions of the public, particularly when linked to media representations of risk, are highly dependent on how messages are framed, who communicates them, and how they are communicated (41, 49). In a crisis risk communication scenario these issues are amplified (64, 112), and misunderstood messages can lead to a failure to act or the wrong action as was the case during Hurricane Katrina (20).

Understanding a lay audience's cognitive beliefs about risk has also been a concern in risk communication. The logic is that if popular interpretations of reality are understood, then risk communicators can be better able to translate technical and scientific concepts into understandable messages (41). Called a mental models approach, lay understanding of specific medical or environmental risks are explored using in-depth interviews (95). Information gathered is then used to tailor and focus health risk messages, similar to standard audience research in social marketing.

Related to the mental models approach is that of knowledge networks from the area of human development and human learning (66, 98). As people learn about their world they establish mental maps or knowledge networks that serve as heuristic devices to organize information (69). People learn through understanding a phenomenon in its entirety. Facts are organized in ways that make sense conceptually to the individual. When new knowledge is presented, the knowledge must resonate with what people already know and how that knowledge is organized and linked to personality, experience, and culture, before it can be assimilated into that individual's working memory (66, 69, 98). One implication is that technical information and directives to act must be prioritized by risk communicators be-

cause lay people cannot necessarily differentiate important from less important facts. Another implication is that although there may be resistance to information in crisis risk communication scenarios because of stress and high arousal states, information linked to pre-existing conceptual maps or mental models is more likely to be understood (98). For example, a new illness that fits an infectious disease prototype will be more easily understood or assimilated if a person already has a mental model of how an infectious disease is transmitted (53). In general, risk communicators need to have some idea of what their audience members believe about different types of risks to help them frame or conceptualize how the audience can understand information presented.

What characterizes the mental state of people exposed to emergencies and disasters? Despite people's widespread concern that they will panic during a crisis, there is little evidence that disasters provoke widespread panic (2, 42, 52, 86, 101, 136). Contrary to popular belief, people may show more affiliative or voluntary behavior during and following a disaster, which may lead to effective collective proactive action (52, 86). Norwood [2005] and Aguirre [2005] have commented that risk communicators' concerns that providing extensive information during a crisis can cause mass panic are misplaced (2, 101). However, in a severe crisis a substantial number of those impacted or exposed may become mentally stressed with acute stress disorder (ASD), with symptoms such as physical shutting down (shock), emotional lability, and inability to make decisions or process new information. Symptoms are usually temporary, but in some persons there may be longer-term disturbance, leading to post traumatic stress disorder (PTSD) usually after the immediate crisis has resolved (56).

The preexisting emotional state of many individuals influences their reactions to crisis communication. Sad, anxious, or angry individuals have less capacity to process new information. Although mental arousal or stress

does create a higher degree of audience attention, the focus of the attention is often narrow, reducing capacity to scan and assimilate a great deal of information or to make complex decisions (66). For crisis risk communicators the presence of a stressed audience suggests that important messages need to be stated simply, prioritized and repeated in crisis situations.

Research from the Disaster Field

Crisis risk communication has also been a large concern of researchers in the field of disasters. Relevant research has focused on disaster warnings, which are event specific and happen right before, during, or after an event. (92, 94). These warnings are different from general public hazard education, which involves general knowledge that can be transmitted independent of the hazardous event and would correspond to pre-event messages. Characteristics of the threat, characteristics of messages, how the warnings are communicated, and how the recipients process the information are all key determinants as to whether the public takes specific protective actions (92, 93).

The hazards and warnings literature is concerned mainly with how to bring about compliance with desired behaviors in hazardous situations: Methods could include giving instructions to shelter in place, to evacuate, to take medications, or to stock up on food or supplies (93). In general, the recipient of threat information must (*a*) receive the information, (*b*) understand the information, (*c*) understand that the message applies to them, (*d*) understand that they are at risk if they do not take protective action, (*e*) decide that they need to act on the information, (*f*) understand which actions need to be taken, and (*g*) be able to take action (92, 94). According to Tierney, "Anything that interferes with the ability of people to successfully complete this sequence of perceptual, cognitive, and behavioral steps—for example, any ambiguity about the meaning, validity, or urgency of the warning, or about what self-protective

actions to take—will result in less than satisfactory compliance with warning messages" (138). Thus one important dimension of crisis risk communication that this literature emphasizes is the feasibility of the recommended actions and the ability of the population to complete these actions. In his review of the warning literature, Sorenson (134) found a high level of empirical support that warning response increases with the following factors: message specificity, message consistency, message certainty, source credibility, and source familiarity—all findings that are reinforced by the communication development literature. Tierney (138) also reports that research consistently finds that the sociodemographic characteristics of the recipients of warning messages are significantly related to their ability to receive, cognitively process, and act on warning information. Additionally, minority group members and those for whom English is not the first language may have difficulty understanding warnings and instructions, particularly if the warnings are provided only in English (1).

In previous studies of natural disasters and technological emergencies, determinants of risk perception and behavior have also been linked to message characteristics and how receivers process them (92). Message consistency is a determinant of understanding, belief, and personalization of risk. Multiple consistent messages are usually more effective than single messages or inconsistent messages (94). The more warnings received, and the greater and more imminent the threat, the higher the probability is that people will take proactive precautions. Risk communications that advocate preparing for a disaster that is not imminent are less successful in motivating behavior change (104).

Message consistency may be relevant particularly for new or emerging threats for which knowledge regarding treatment, prophylaxis, and the epidemiology may change over time. Consistency also refers to similarity between the tone of the message and the information contained therein (i.e., something bad

is happening, but there is no cause for concern). Inconsistency also occurs when events are impending or evolving and information is not updated on a regular basis.

Accuracy of messages is important because errors in accuracy of past warnings caused people not to respond to subsequent warnings (91). Clarity of messages includes clear wording in language that can be understood by the target audience. Certainty of what is communicated can affect the level of belief in a warning and related decision-making: Ambiguous messages will be misinterpreted. That is, if an evacuation for a threat is voluntary but there is a strong recommendation to evacuate, interpretation will vary. This variance is especially relevant in an unplanned event or disaster in which there may be a number of unknown parameters such as the agent, the exposed population, the timeframe, and/or the source or in situations in which national security is an issue.

Other factors of relevance in disaster response communication include sufficiency of information. In studies of hurricanes, floods, and volcano warnings, general and vague warnings cause people not to act (76), whereas more detailed information leads to higher perceived risk and increased response (104). People need clear guidance and specific information and actionable messages about how to act. One cannot assume that people will know the appropriate actions to take. Communications need to be specific as to what, when, how, and for how long. Finally, location plays an important role in messaging. Messages that provide information on specific geographic areas of impact or a defined population lead to increased perception of risk and increased probability of appropriate behavioral response.

Because of the emotionally charged nature of disaster or terrorism events, utilization of risk communication theory in developing effective messages is essential (31). Social, psychological, and demographic characteristics of message recipients, as well as their observations of the environment, are as important as the source in determining whether warn-

ings and risk communications will be heard and heeded. In general, recipients of such information are not passive, but actively seek to confirm, qualify, and explain the messages that they receive by seeking confirmation or disconfirmation from other sources, comparison with past experience, and direct observations of the situation at hand. One of the first things recipients of warnings attempt to do is to confirm the message about the crisis or disaster (94). Similarly, past experience affects behavior. If warning recipients have survived similar past disasters without action, they are unlikely to take action in the current situation despite warning messages, a factor that clearly influenced nonevacuation during Hurricane Katrina (139). Finally, those with fewer resources and less social capital may be less capable of heeding disaster warnings, which was also apparent during the recent Hurricane Katrina disaster (20).

In summary, situational factors, individual and group level characteristics, and characteristics of warning messages all determine the degree to which warnings are heeded. Research consistently finds that disaster warnings that are locally relevant and culturally competent are more likely to result in believing and acting on warnings. Greater knowledge of and prior experience with the hazard, higher education, communication with family members, and higher socioeconomic status increase the probability that warnings will be heard and heeded. Message specificity, frequency, credibility, certainty, and recipient familiarity with the source increase warning efficacy (134, 138).

Health Promotion and Communication

Another literature important for fashioning crisis risk communication practice is health promotion and communication (57, 130). Research in health promotion and communication has addressed how the use of planned, persuasive messages and communication campaigns can change awareness and health

behaviors within populations (11, 48, 54, 57, 60, 84, 116, 130, 141, 150). The development and testing of messages are tied to a long history of marketing and persuasive appeals with both commercial and social objectives (19, 71, 85). A great deal of research on message development and media effects has been generated within academic and field settings as well (23, 60, 84, 150).

Planned messages communicate content as perceived or intended by the individual who expresses them (senders) and have meaning attributed to them by those who receive them (receivers, audience) (54, 149). The intended audience is also called the target or priority population and is comprised of those individuals whose behavior, attitudes, or knowledge are to be influenced, directly or indirectly. Other concepts of importance are intended and unintended outcomes of communications, channels of communications, the source of the communication, and message distribution or delivery strategy (149). These terms describe elements of communications that are important when planning content: In this field channels and communications strategies are linked to presentational formats, which in turn determine how content is presented. As has been noted, these elements are all important in disaster response communications (92).

A classic model that helps to categorize communication factors linked to success is the communication persuasion matrix a two-sided matrix model of communications that describes strategy and impact (89, 90). The input side of the matrix includes elements of communications, including source, message, channel, audience, and destination, that relate to the characteristics of the communications itself. The output side of the matrix is concerned with how the audience processes information and includes a hierarchy of necessary steps before behavior change can occur (89, 90).

Using experience and research in creating mass media messages and campaigns, certain elements create more effective commu-

nications including a credible source; clear, concrete, and consistent messages and suggested actions; and messages that resonate or “converge” with a target audience’s perceptions (149). Additional factors are message acceptance and retention, use of dissemination channels where the probability of audience exposure is high, and the crafting of messages that are salient and culturally competent for receivers or audiences (60, 84). The higher the probability is that an audience will process the message, the more likely it is that messages will make an impact (60, 141, 150), which also implies that messages need to be adequately disseminated to be effective. In today’s highly saturated media markets, effective communication campaigns are comprehensive, using multiple channels for dissemination to increase audience exposure. As levels of exposure to the message and capacity and motivation to process information among audiences decreases, impact levels also decrease.

Concepts from the health belief model also inform message development practice (61, 122). This widely used model asserts that health behavior change is based on the important role that cognition plays in predicting behavior in response to health risks. In this model people take actions to reduce exposure to a risk if they believe that they are susceptible, that taking certain actions will be beneficial in reducing their susceptibility to the condition, and if they believe that the barriers to actions (or costs) are outweighed by benefits. Action is stimulated by reminders or cues to action.

Protection motivation theory (108, 120) is a closely related social psychological model that suggests that ideational constructs of threat appraisal and coping appraisal are keys to shaping an individual’s intention to protect themselves. For example, perceived susceptibility to the impact of a crisis or disaster is threat appraisal, and attaining some degree of preparedness or feeling some degree of self-efficacy in regard to how a threat could be experienced constitutes coping appraisal.

These notions are similar to protective actions touted in the disaster field. Social learning theory (or social cognitive theory) presumes that people learn directly from others through their actions or examples. Thus persons learn from imitating or modeling others, and the degree to which they can carry out actions is associated with their skill level, as well as attitudes about their own capacity to perform the behavior (self-efficacy) and their belief that behavioral performance will lead to some desirable outcome (outcome expectation) (5).

Another way to view how social psychological processes can shape understanding and action is through stage theories, which suggest that people are at different levels of awareness and motivation as regards health conditions and behaviors and that outreach must tailor messages to those different levels (109). One variant of this type of theory, the precaution adoption process (146, 147) has been applied to risk communication and decision making. Here people pass through stages of increasing engagement, from ignorance to compliance on an issue, each stage representing different patterns of behavior, beliefs, and experience. Of importance are understanding transitions between stages, and this theory suggests that behavior is complex and embedded in different types of social and communication environments. Stage theories may be relevant particularly in precrisis risk communication or hazard education because we know that most people currently in the United States are insufficiently prepared for disasters (6, 29, 48, 75), have little specific knowledge about potential bioterrorism agents (9, 55, 58, 152), and are not convinced of governmental preparedness (83).

Elements from social marketing, literacy, and readability assessment also inform strategic approaches to health communication (3, 46, 47, 71, 85). One useful concept from social marketing, for example, is that of audience segmentation: creating specific approaches and messages for audiences with diverse social, cultural, or demographic back-

grounds. This concept has been translated in crisis risk communication as understanding different stakeholders and creating messages that address their concerns. Another concept is formative research, which implies extensive testing and pretesting of communications and messages among audience members especially among hard-to-reach audiences (47). Although not always possible in a crisis, having pre-event messages available presumes some degree of audience testing (135). Additionally, social marketers account for marketing mix when designing health messages. This involves defining a product (may include concepts, information, service, or a physical product), price (cost to the consumer, not necessarily monetary), place (channel through which the product is delivered), and promotion (communication and/or persuasive activity) (18, 71, 85). Field practice in this area suggests that in America today, persons are visually literate and demanding. For example, persons read from left to right; are drawn to bright colors, action, and graphics; get bored and frustrated with slow transmissions; and yet typically cannot remember more than a few main messages. From the literature on political communication, we also know that many people may get information from the mass media, but they will also seek out information from friends, colleagues, and opinion leaders. Understanding this multistep flow of information is important in designing risk communication messages and materials (65, 149).

Finally, from the literacy and readability literature we know that creating easy-to-read materials is important to reach a general audience (34, 46). Recent surveys have shown that among the general public, half of all adults read at an eighth-grade reading level or less (34). Low-literacy persons tend to think in more concrete terms, have less vocabulary, and are less able to interpret nuanced expressions (4, 44). For crisis risk communication, this finding enforces the need for pictures and graphics to illustrate recommended concepts and actions.

Media Studies

Two large components of crisis risk communications are understanding and working with the media. Recent studies suggest that as people become more dependent on the media as their major source of information, working with the media to communicate disaster information to the public is of paramount concern in crisis communications (51). However, the ease and access many people have for broadcast and Internet sources have meant that expectations for rapid retrieval of information has increased. Media portrayals in turn mediate popular perceptions (68), and the news media in particular play an increasingly large role in communicating health risks to the general public (10, 82, 100, 103). Gallup's 2002 poll on media usage found that Americans continue to use local television (51%) and local newspapers (44%) as primary sources of daily news and information, followed by cable news channels (39%) and nightly network news programs (36%). Radio is recognized as a continuing viable daily news source. As demonstrated during recent major national crises, people turn to the news. For example, during the events of September 11, 2001, people were "glued" to their television sets, and most voiced a high degree of trust in what they read and saw—this finding runs contrary to public perceptions about news media in noncrisis situations where distrust tends to be high (121).

Growing in importance alongside the influence of health in the news media is the impact of the World Wide Web, a technology that allows almost instantaneous access to news from around the globe. At present, two thirds of Americans routinely go online for personal communications and to search for specific information, and 76% of Americans have access (45). Of the 72,000,000 American adults who go online in an average day, 6% are seeking out health information, typically about specific diseases, conditions, or treatment (45). Whereas women and the well-educated are the highest users at present, a

great deal of evidence indicates that inner-city, ethnic minority, and disadvantaged Americans are quickly gaining access to this medium (15), despite continued concerns about the "digital divide" (63).

Both the news media and the Internet have been criticized as often publishing inaccurate, sensationalized, or misleading stories (127, 148) that are not necessarily the most scientifically significant. The news is not peer-reviewed and many health reporters have no health or science training (81, 148). Most Internet sites do not have a scientific review process, and many sites contain inaccuracies or biases (13, 37, 74). However, both news outlets and the Web are the most efficient means to distribute information quickly to large numbers of people as well as providing consumers with information from multiple sources quickly (36). Thus the current preoccupation of crisis risk communication to create clear and consistent messages and communicate them effectively to the news media is not misplaced.

During a health crisis or disaster, utilization of media sources increases exponentially (51). Internet usage immediately doubled following the September 11 attacks, from the 6 million who had visited online news sites a week before the attack to an average of 11.7 million who visited online news sites each day during the week after the event (51). The Red Cross's Web site alone averaged 398,000 unique visitors a day during that week. A Harris Interactive's follow-up survey also noted that two weeks after September 11, the number of Americans visiting news sites had more than doubled (51). Thus, although television and print media remain the primary sources of news and information for the American public, in the event of public crisis and the subsequent need for immediate information, there are strong data to support that the public freely turns to the Internet for its around-the-clock, routinely updated, and interactive news and information communication. The Internet's penetration as a relied-upon news source is also confirmed in a recent

Gallup Poll on media usage, which revealed that of all media sources, the Internet was the only source that showed an increase in use. As Gallup succinctly explains, “more people now report using Internet sites than ever before for their news” (25). The public has come to expect that crisis risk communication will be delivered through the Internet (67, 118).

Following the events of September 11, 2001, and the subsequent anthrax occurrence, the media was quick to disseminate the “news” and bombard the public with information and recommendations about a variety of potential threats and self-protective actions (16, 119). Many people actively sought out information, as well as purported protective devices, products, and medications, on the Internet and from private health care providers (24, 67, 102). Public health agencies were inundated with requests for interviews and information from the media, health professionals, and the general public (110, 119). In addition to providing requested information, public health agencies and their communications officers spent a significant amount of time clarifying incomplete, inaccurate, or ambiguous information and perceptions, as well as monitoring the media to assess what was being communicated (110). In some cases, the answers to these types of questions were unavailable or unknown, even by the experts. In other instances, there were conflicting messages from varying media channels, which left the general public with a sense of skepticism related to health prevention messages.

In particular, news delivery outlets that demand real-time broadcasting often run counter to scientific and institutional cultures that base information flow on scientifically validated and top-down clearance processes for disseminating information about risk (119), a situation exacerbated during the anthrax scare. In hindsight, these events convinced the Centers for Disease Control and Prevention (CDC) and public health agencies that they must be better prepared for the deluge of demand for risk communication during a crisis; otherwise public health agencies could

risk losing centralized control of the risk communication process, and ultimately, credibility (119). Specifically, inconsistent risk communication between the media, the general public, and potentially affected postal workers during the anthrax crisis was exacerbated by a lack of organizational preparedness for such an event (70, 136, 137, 142). Increased training in media relations and risk communication and establishment of emergency operations centers (EOCs) in many health departments are directly linked to better media and communication input and output.

Using news media monitoring to understand actively what different stakeholder groups needed to know and what the media was reporting accurately, inaccurately, or not at all was a crisis risk communication innovation during the anthrax scare (110, 111). Content analysis of media is the systematic categorization of symbolic meanings of cultural products and representations to see trends and make interpretations of phenomena that are not directly observed (12, 73). In the anthrax situation, this technique was a proxy for more extensive pretesting or audience research and helped to shape media messages (110, 111).

A number of media studies have looked at other recent public health crises and how the media and the public have responded. For example, during the SARS outbreak in early 2003, most persons surveyed obtained information through the media and the Internet (22, 145). Although the response of the CDC and other health agencies was much more organized for the SARS outbreak in the late spring of 2003 (87) than for 9/11 or the anthrax scare in 2001, researchers have argued that the SARS epidemic also bred a secondary epidemic that the news did not actively counter: fear and stigmatization of persons who were perceived as potential sources of infection (105). Quickly following the SARS epidemic, an early flu season in the fall of 2003 and reports in the news media of deaths from flu in late 2003 also sparked a great deal of media attention and led to flu vaccine shortages such that low-risk populations wanted the

immunization and high-risk patients could not obtain the vaccine (27). In the following year (2004) there was an actual flu vaccine shortage caused by production irregularities; however, this potential crisis did not lead to much media interest because the flu season was relatively late and mild compared with the year before, and in fact, by January of 2005 there was a surplus of flu vaccine (21, 126). As can be seen, media coverage is a powerful factor in these events.

As suggested above, news media outlets for dissemination of health risk especially in a crisis represent a doubled-edged sword, truth sometimes mixed with exaggeration. Theories to account for the dissonance between "truth" and the influence of popular media formats on public perceptions are numerous. One idea is that of the meaning construction function of the press, people act not on what is truly taking place but on what they think is taking place, thus providing an underlying rationale for analysis of news content (79). For risk information, this perspective does not see risk as an objective hazard, threat, or danger, but instead as one that is inevitably mediated through social and cultural processes (8). Closely linked to this is the notion of the agenda-setting function of the press, which is the thesis that the selection or deselection of what is newsworthy by the news media shapes public perceptions of what is or is not important to think about, rather than what to think (88).

Another key concept is the framing of messages, an important issue in media advocacy efforts (26, 144). Message framing suggests that different presentations of the same information can elicit different responses. For example, journalists not only select topics to cover but may also emphasize or de-emphasize specific information within a text (35). Not only do frames between authors and outlets vary, but also frames change over time especially as new information becomes available, promoting specific points of view (35). As part of current crisis risk communication practice, this idea of framing informs message

mapping, a technique by which risk communicators anticipate concern and create concise messages (30, 32). It also suggests message framing as a strategy by which risk communicators anticipate resistance or disagreement with messages conveyed, and they build message maps that also include opposing viewpoints. Anticipating points of resistance helps risk communicators refine their messages to address audience concerns, thus preventing some degree of criticism (26, 144).

Linked to framing is social representations theory, which suggests that when society is faced with a new phenomenon such as a disease or outbreak, widely shared ideas about it may emerge spontaneously (145). When events evolve from stories of "them" into stories affecting "us," then public interest tends to grow. Washer [2004] suggests that these media phenomena are a collective coping mechanism that helps people by imposing order on a seemingly chaotic and unpredictable situation (124). Media coverage of Hurricane Katrina, with its missteps and missed communication opportunities has yet to be fully analyzed; however, this event shows that successful crisis risk communication is completely dependent on a larger response system readiness, which in the case of Katrina was fragmented or nonexistent in the hours and days just before and immediately following the crisis (20).

Finally, social amplification theory suggests that hazardous events interact with psychological, social, cultural, and institutional factors in ways that may attenuate or intensify risk perceptions (64, 112). Some risks of relatively low concern can become the focus of concern and sociopolitical activity within a society (risk intensification), whereas other ongoing more serious hazards may receive comparatively less attention (risk attenuation). Thus recently, flu shots, or lack of flu shots, became a heightened concern, whereas the presence of radon gas in households continues to be underrecognized as a risk. The media is a primary conduit through which these collective risk perceptions are communicated,

sometimes called amplification stations, even though the risks communicated may not be an accurate reflection of true risks (64, 112).

PRACTICE

This literature review summarizes theories and gives some examples of research that inform current practice in crisis risk communication for public health. A practice issue is what are the state and status of crisis risk communication practice at national state and local levels in the United States? Although there is a vast and growing literature on the principles of crisis risk communication, actual examples of practice are contained mainly within descriptive case studies, not evaluation studies. For example, some descriptive case studies consider specific recent communication crises such as anthrax, smallpox, SARS, or vaccine shortages (96, 117, 119, 126, 128).

There are also some articles and books that have addressed the emergent practice of pre-event crisis risk communication planning. Organizations and public health agencies have invested heavily in pre-event crisis communication planning so that communicators have techniques for managing a surge in informational demand in a crisis. Conducting audience research, developing channels for delivering messages, and creating prototypes of anticipated messages and materials pre-event are now part of the disaster preparation process (135, 143). Other types of activities include pre-event media monitoring, audience survey research, media relations training, and organizational communication management planning. Additionally, simulations and tabletop exercises provide public health workers with risk communication skills and media relations experience prior to a crisis (33, 96). Although books and articles suggest that progress has been made in understanding the needs and parameters of crisis risk communication in public health emergencies, they fall short of systemic evaluations of how effective risk communication has been during actual crisis communication events.

Another way to assess crisis risk communication in public health practice is to determine current crisis risk communication competencies and the degree to which they are embedded in public health agencies' overall workforce. Again this approach elicited neither studies nor a standard set of competencies proposed. One issue may be that crisis risk communication is an emergent discipline for which competencies have not yet been established. Another interpretation is that this field is a hybrid: A public health risk communicator needs to have health promotion planning and program implementation competencies, media literacy, media advocacy, and media relations competencies, and must also be knowledgeable about disaster management norms and the incident command system (ICS) or national incident management system (NIMS)

Thus the default approach of this author has been to assess the current content of readily available and free crisis risk communication guidelines and curricula that have substantial content. At the time of this review, only five curricula were identified that were in general use and were easily accessible.

CDC's Crisis and Emergency Risk Communication (CERC) by Reynolds et al. (114a) is a major compendium for risk communication practitioners. It consists of 12 modules that first outline the elements of a crisis and the importance of message development and audience research, creating a crisis communication plan and spokesperson guidelines and working with the media. There is an extensive section on legal considerations in regard to communication and the media. The first edition does not integrate risk communications into a larger incident command or disaster response framework such as the NIMS; however, a new revision will do this.

The *Primer on Health Risk Communication Principles and Practices* (81a), by Lum & Tinker, of The Agency for Toxic Substances and Disease Registry, is not oriented to disasters or bioterrorism per se but contains a number of tips and fact sheets about working with

stakeholders and communities to build trust, communicate clearly, translate science for lay audiences, respond to questions, create framing documents, and manage hostile interactions. This document outlines interpersonal skills needed to communicate risk effectively.

Communicating in a Crisis: Risk Communication Guidelines for Public Officials (136a), published by the Substance Abuse and Mental Health Services Administration, stresses the anatomy of a crisis as regards creating messages, understanding audience needs, managing audience stress, working with the media, handling misinformation, and organizing meetings and forums. It contains a number of good examples for communicators. *Risk Communication with the Media During a Public Health Crisis*, from St. Louis University, is a CD-ROM that features V. Covello (122a).

The *Crisis and Emergency Risk Communications Toolkit*, from the Emergency Preparedness Office of the State of California is an updated version of the original CDC CERC manual and is the most comprehensive and best organized curriculum or set of guidelines reviewed (23a). It emphasizes both internal and external risk communication planning and management, creating a crisis communication plan, developing messages and message maps, and creating media materials such as press releases and advisories. It should be used within a multisectoral incident management system (IMS) and has many subject-specific fact sheets. The only drawback is that it is not yet available online.

These five sets of guidelines written for crisis risk communication practitioners are of varying depth and quality. All these toolkits stress organizational development, message development, audience research, audience relations, message delivery, and media relations. The original CDC CERC manual is strong in regard to federal relations between agencies and the role of the press, whereas the California version is stronger in regard to pre-crisis planning and internal management or

team building. None of these guidelines goes into much depth about media monitoring as a proxy for audience research during a crisis, opinion polls, outreach to underserved populations, message framing, media or science literacy, or outcome monitoring or evaluation.

CONCLUSION

The practice of crisis risk communication marries exigency with health communication basics to create emergent norms of practice reflecting the redefined role that public health finds itself in during the twenty-first century: emergency responder. As this role is reclaimed by public health, crisis risk communication will play an increasing part in helping populations cope with natural and manmade disasters that have both physical and mental health impacts. It is only natural that public health will be called on to parlay medical, epidemiological, behavioral, and statistical knowledge into messages and concepts that audiences can understand, even as these audiences experience hardship or stress. Although only descriptively documented at present, as practices become normed and competencies defined, evidence-based assessments of crisis risk communication will also likely appear. One of the most promising ways to think about evaluations is through systematic media monitoring before, during, and after an event. Other types of evaluation are process tracking, to determine where messages were placed, and opinion surveys, to assess the degree to which populations were exposed to and are assimilating messages. As we collectively face potential disasters such as pandemic flu, industrial accidents, bioterrorism, intense tropical storms, or other serious health threats, being able to communicate appropriately to the news media and to the public, although never assured, can be more closely approximated if basic principles of practice are followed. It is gratifying to see how well these practices are being adopted and adapted at present to the serve the public's health.

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Contents

Symposium: Public Health Preparedness

Introduction: Preparedness as Part of Public Health <i>Nicole Lurie</i>	xiii
Assessing Public Health Emergency Preparedness: Concepts, Tools, and Challenges <i>Christopher Nelson, Nicole Lurie, and Jeffrey Wasserman</i>	1
Quality Improvement in Public Health Emergency Preparedness <i>Michael Seid, Debra Lotstein, Valerie L. Williams, Christopher Nelson, Kristin J. Leuschner, Allison Diamant, Stefanie Stern, Jeffrey Wasserman, and Nicole Lurie</i>	19
Risk Communication for Public Health Emergencies <i>Deborah C. Glik</i>	33
First Responders: Mental Health Consequences of Natural and Human-Made Disasters for Public Health and Public Safety Workers <i>David M. Benedek, Carol Fullerton, and Robert J. Ursano</i>	55
Epidemiology and Biostatistics	
Network Analysis in Public Health: History, Methods, and Applications <i>Douglas A. Luke and Jenine K. Harris</i>	69
Methods for Improving Regression Analysis for Skewed Continuous or Counted Responses <i>Abdelmonem A. Afifi, Jenny B. Kotlerman, Susan L. Ettner, and Marie Cowan</i>	95
New Challenges for Telephone Survey Research in the Twenty-First Century <i>Angela M. Kempf and Patrick L. Remington</i>	113
Seasonality of Infectious Diseases <i>David N. Fisman</i>	127

Health Impact Assessment: A Tool to Help Policy Makers Understand Health Beyond Health Care <i>Brian L. Cole and Jonathan E. Fielding</i>	393
Social Environment and Behavior	
Physical Activity and Weight Management Across the Lifespan <i>Jennifer H. Goldberg and Abby C. King</i>	145
The Hitchhiker's Guide to Tobacco Control: A Global Assessment of Harms, Remedies, and Controversies <i>Ronald M. Davis, Melanie Wakefield, Amanda Amos, and Prakash C. Gupta</i>	171
Youth Violence Prevention Comes of Age: Research, Training, and Future Directions <i>Kara Williams, Lourdes Rivera, Robert Neighbour, and Vivian Reznik</i>	195
Church-Based Health Promotion Interventions: Evidence and Lessons Learned <i>Marci Kramish Campbell, Marlyn Allicock Hudson, Ken Resnicow, Natasha Blakeney, Amy Paxton, and Monica Baskin</i>	213
Risk Communication for Public Health Emergencies <i>Deborah C. Glik</i>	33
Environmental and Occupational Health	
The Epidemiology of Autism Spectrum Disorders <i>Craig J. Newschaffer, Lisa A. Croen, Julie Daniels, Ellen Giarelli, Judith K. Grether, Susan E. Levy, David S. Mandell, Lisa A. Miller, Jennifer Pinto-Martin, Judy Reaven, Ann M. Reynolds, Catherine E. Rice, Diana Schendel, and Gayle C. Windham</i>	235
Beryllium: A Modern Industrial Hazard <i>Kathleen Kreiss, Gregory A. Day, and Christine R. Schuler</i>	259
Adverse Late Effects of Childhood Cancer and Its Treatment on Health and Performance <i>Kirsten K. Ness and James G. Gurney</i>	279
First Responders: Mental Health Consequences of Natural and Human-Made Disasters for Public Health and Public Safety Workers <i>David M. Benedek, Carol Fullerton, and Robert J. Ursano</i>	55
Health Services	
Managed Behavioral Health Care Carve-Outs: Past Performance and Future Prospects <i>Richard G. Frank and Rachel L. Garfield</i>	303

Rationale and Public Health Implications of Changing CHD Risk Factor Definitions <i>Robert M. Kaplan and Michael Ong</i>	321
Delivery of Health Services to Migrant and Seasonal Farmworkers <i>Thomas A. Arcury and Sara A. Quandt</i>	345

Public Health Practice

Lessons from Cost-Effectiveness Research for United States Public Health Policy <i>Scott D. Grosse, Steven M. Teutsch, and Anne C. Haddix</i>	365
Health Impact Assessment: A Tool to Help Policy Makers Understand Health Beyond Health Care <i>Brian L. Cole and Jonathan E. Fielding</i>	393
How Can We Increase Translation of Research into Practice? Types of Evidence Needed <i>Russell E. Glasgow and Karen M. Emmons</i>	413
Community Factors in the Development of Antibiotic Resistance <i>Elaine Larson</i>	435
Assessing Public Health Emergency Preparedness: Concepts, Tools, and Challenges <i>Christopher Nelson, Nicole Lurie, and Jeffrey Wasserman</i>	1
Quality Improvement in Public Health Emergency Preparedness <i>Michael Seid, Debra Lotstein, Valerie L. Williams, Christopher Nelson, Kristin J. Leuschner, Allison Diamant, Stefanie Stern, Jeffrey Wasserman, and Nicole Lurie</i>	19

Indexes

Cumulative Index of Contributing Authors, Volumes 19–28	449
Cumulative Index of Chapter Titles, Volumes 19–28	454

Errata

An online log of corrections to *Annual Review of Public Health* chapters (if any, 1997 to the present) may be found at <http://publhealth.annualreviews.org/>