

PRE-EMPT

(PRE-EVENT MESSAGE PREPARATION FOR TERRORISM)

VERIFICATION ANALYSIS OF BOTULISM AND FOODBORNE ILLNESS LITERATURE

Year 3 Findings

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I. EXECUTIVE SUMMARY

The UCLA Pre-event investigative team studied the general public's responses to a potential outbreak of botulism linked to bioterrorism and then compared results to literature on behaviors and responses of persons to foodborne illnesses. Generally findings suggest an uninformed public in regard to general disaster and bioterrorism preparedness as well as information about foodborne illnesses and *botulism* specifically. Botulism is not a well known condition and few persons know what the symptoms are, how it is caused, how to prevent it or its treatment. The verification analysis conducted in Year Three of the Pre-event project extends and amplifies these findings some of which are the following:

- Both our findings and those of others show that people perceive foodborne illnesses as low probability events, and demonstrate an optimistic bias towards their own vulnerability to those events.
- The extant literature also suggests that people feel some degree of control over foodborne illness risk at home. However the less people know about an illness the more fearful they are and the more at risk they feel.
- In our findings people knew that botulism was a food borne illness but did not know what the symptoms were or how to treat it. In one study in at risk populations (Chiou, Hennessy, Horn, Carter, & Butler, 2002) in Alaska respondents knew about the disease and its symptoms but not that there was an antitoxin. Moreover even after educational campaigns, knowledge levels have remained low, suggesting low interest or involvement by persons as regards foodborne illnesses.
- In our findings people's intuitive wisdom suggests that government is not prepared for an outbreak of botulism. Actual projections in the published literature suggest that this is not a misperception: Wein and Liu's (2005) mathematical model suggests that in a botulism outbreak hospital surge capacity would be overwhelmed.
- In our findings people were knowledgeable of generic rather than botulism specific precautionary measures. In related studies persons identified and also

enacted individual practices that would prevent foodborne illness such as more thorough cooking or boiling.

- Collective prevention efforts such as irradiating food meets with skepticism as many believe this process increases people's exposure to radiation. People are also more willing to invest resources in treatment than in prevention.
- Our focus groups revealed that people are familiar with and have experience with foodborne outbreaks. They know that CDC and local health departments deal with these events and this is where to find information.
- People interviewed had numerous sources of information with television, radio and internet most popular. Ralston et al (2000) found that people turn to television on this topic but also magazines, print media, books, and food labels.
- In our findings canned food and restaurant food were most often cited as sources for botulism. In the literature reviewed, being in a high risk population or having direct personal experience had the largest impact on perceived risk. Higher risk perceptions were also linked to enhanced knowledge and behaviors. However even in high risk groups there were gaps in knowledge.
- Generally women had higher risk perceptions of foodborne illnesses than men.
- In our findings most persons turn to the internet for in depth information or background information about an outbreak or threat but continue to tune to first local and then national television or radio for more immediate news and information. For continuing local threats they also turn to local governmental or nongovernmental agencies for aid or information.
- In the literature reviewed, while internet and media use for many health issues has soared in recent years, many people still would prefer to get health information from trusted sources like physicians or representatives of a local health department. Persons who are older or who have lower SES are more likely to turn to interpersonal sources for information.
- Both our findings and the literature suggest that people are ambivalent about the honesty of media reporting. The tendency is to access multiple sources of information but this may also vary depending on whether a crisis is imminent or emergent: the less stress the more able people are to access multiple sources of information.
- People do increase preparedness and risk reduction behaviors in the face of an impending biological threat. For foodborne illnesses this can mean changing what is eaten, how food is prepared or shunning certain restaurants or foods.

- In regards to emotional and behaviors, reactions, or response to actual foodborne or to other outbreaks or events our own data suggest more behavioral than emotional responses. The literature reviewed which has often followed an event rather than being pre-event research, suggests serious psychological consequences to outbreaks including imaginary symptoms, anxiety, depression, panic or PTSD (post traumatic stress disorder). This literature is controversial as other studies suggest that while shock and emotional injury are common after an event widespread panic is not typically observed.
- Our findings and those of the literature reviewed found that people question the capacity and readiness of local, state, and federal agencies to handle an emergency outbreak whether foodborne or otherwise.
- In both our findings and in the literature reviewed many people are cynical about government and distrustful of newer food processing methods such as irradiation that could ensure the safety of the food supply.
- In pre-testing our messages we did find that people preferred short concise consistent messages in every medium we tested (radio, television and fact sheets). There was a great deal of confusion in our populations regarding certain terms and details in messages we created and pre-tested – the mental model of a foodborne illness is quite settled in people’s minds and when new ideas such as “aerosolized” distribution is introduced, we found that persons started to confuse a foodborne with an infectious disease outbreak. Care must be taken not to overload materials with words that throw the audience off message.
- The literature confirms our findings about the importance of consistency and simplicity in regards to messages. In addition, in the case of outbreaks, timing of messages is important. People need information quickly but a vacuum of information leads to greater anxiety, distress and actions that may not be risk reducing.
- The literature also suggests that disease related information in an outbreak scenario can be easily misinterpreted, implying that message pre-testing is a positive practice. Finally the media can be a source of both good information and misinformation, again implying that positive relations between media outlets and public health officials in an outbreak are a must.

II. INTRODUCTION

An essential element of preparedness for emergencies is communication with impacted and potentially impacted publics (Covello, Peters, Wojtecki, & Hyde, 2001; Fitzpatrick & Mileti, 1994; Landesman, 2001). The timely release of accurate information about imminent or present hazards helps achieve key goals of emergency response: 1) increasing the likelihood that people at risk will make informed decisions that will prevent illness and injury and save lives; 2) reducing anxiety levels in the general population and avoiding unnecessary care-seeking by unthreatened populations; and 3) facilitating relief efforts (Partnership for Public Warning [PPW], 2003).

There is a large literature on the social, cultural and psychological correlates of disasters in the field of disaster research that research reported here extends (Burkhart & Ford, 1991). In that literature a distinction is made between “disaster warnings” and more general public hazard education and communications. The latter involves general knowledge that can be transmitted independent of the hazardous event. Disaster warnings and responses are event specific and occur either right before, during or after an event (Mileti and Fitzpatrick, 1991; Mileti and Sorensen, 1990). To some extent the research carried out here corresponds to pre-event education, however as much of the focus has been on creating materials that could be used during a disaster, there are also elements of disaster warning systems improvement. More importantly, in the disaster literature, most of the studies are conducted after a disaster occurs, rather than prior to a disaster (Drabek, 1999) and most of the studies are based mainly on research on natural and industrial disasters, not terrorist threats (Foster, 1980; Genesco, 1990; Fitzpatrick & Mileti, 1994; Hammer & Schmidlin, 2002).

While there is an emerging literature on risk communication and bioterrorism threats (Koplan, 2003; Vanderford , 2003; DiGiovanni, 2002), few studies are linked to a particular agent or disease. The research in this topic area is more likely to be linked to an impacted population or systems that manage risk and threat (National Research Council, 1989). Thus to find research comparable to our own for verification analysis has been a challenge, especially in the area of foodborne outbreaks and illnesses, where social and behavioral science research is sparse. Prior to describing the verification analysis approach used for this report, a brief summary of the data analyzed in Years 1 and 2 of this project is presented.

Year 1 Data

During Year 1 of the ASPH/CDC grant, UCLA carried out an analysis and report-writing on 11 focus groups conducted with diverse populations from across the United States about *botulism*. Participants from the general public exhibited little knowledge about botulism compared to first responders who were highly informed and motivated to seek information. In fact, many of the botulism-specific findings were quite generic and could be applied to many biological agents. Respondents were distressed by the botulism scenario but also were very specific about their informational needs, especially with regard to wanting information as soon as possible about the “anatomy” of the event, family health and well being, food and water safety, and community protection. Participants were quite clear about media preferences they would turn to during a terrorist event, mentioning television, radio and internet most often. However, participants also raised concerns about power shutdowns during an event, the need for confirmation by

esteemed authority figures, and lack of access for persons who did not have language capacity or who were poor, sick or disabled. Levels of trust of governmental authorities spanned the gamut from low to high. All persons interviewed had a great of trust in emergency responders, while the media, federal officials and local politicians drew mixed responses. Participants appreciated the CDC botulism materials, feeling they were credible, comprehensive and reassuring. However, many also admitted they did not understand all of the concepts presented. Participants were most interested in receiving messages that could inform their actions during an event.

Year 2 Data

During Year 2 of the Pre-event Cooperative agreement the UCLA research team carried out message writing and message pre-testing using nine focus group interviews with diverse populations from across the United States to assess radio, television and print warnings on *botulism*. There seems to be some awareness of general terrorist and disaster response systems among the general public, but here too information is not consistent and there is some misinformation. In regard to more specific agents such as botulism, the American public was not well informed and there was a great deal of confusion about transmission, medical care, and prevention linked to botulism. Specifically while the sequencing and formatting of messages tested in a second round of focus group interviews was adequate, as messages developed, we shifted from describing botulism as a foodborne illness to one which could be spread by aerosolized means. This shift caused audiences to become confused; to many people, airborne transmission meant that botulism was an infectious disease. These findings forced us to retreat to more

simple descriptions of botulism as a form of food poisoning. Using newer learning theory models, we interpreted findings to show how people's conceptual and logical frameworks held in long term memory conform to certain heuristics. In this case foodborne diseases are distinct from infectious diseases. Assessing audiences' conceptual frameworks allows messages to be framed so that they do not compete or be confused with other messages, but can be assimilated with what is already known.

Verification Analysis

A verification analysis of the focus group findings across agents and populations was conducted by comparing our Year 1 and 2 findings to those from the published literature that is substantively related to the issues addressed. Exposition of this comparison is the goal of this Year 3 report. The objective is to verify focus group results from Years 1 and 2, and also to identify gaps and contradictions between the focus group findings and literature-based findings. In the case of contradictions, explanations for the contradiction will be explored by literature review and discussions using the expertise in our research teams. These discussions will be aimed at illuminating the contradiction by use of intellectual tools such as positing extreme cases, deviant cases, contrasting cases, and consideration of methodological effects related to identifying a presumed contradiction. The result would be that a presumed contradiction between the focus group findings and the literature may be understood as an apparent contradiction, not a factual one. Comparison of focus group findings and literature-based findings can produce further insights in cases where direct comparison is impossible and where clear outcomes to the comparison are lacking. Overall, the result will be greater confidence in the focus

group findings due to this verification process. Additionally, this cross-validation process will serve to identify gaps in the existing literature on risk communication as well as identify contributions made to the existing body of knowledge by the research conducted in years one and two of this project.

III. METHODS

The verification analysis sought to increase the credibility and representation factor of the focus group results found in Years 1 and 2 by comparing them to studies on similar issues and topics. This process sought to ensure a reliable comparison by employing different researchers who followed similar methodological protocols outlined below.

Aims

The following aims were created to guide the literature review:

1. Identification of extant literature that reports the results of behavioral and/or communications research done either by a quantitative or a qualitative research design.
2. Identification of extant literature that is categorized as one of the following data types: journal articles, journalistic reports, military reports, monographs, dissertations, survey data, and grant reports.
3. Assessment of the appropriateness of comparison of a given set of research results based on how germane the data is to the focus group research.

4. Assessment of the strength of the focus group findings by comparing them to the findings of similar research by looking for relatedness of findings.
5. If it is ascertained that findings appear to be different (relative to the focus group results), then explanations for the apparent disconfirmation will be explored.
6. Last, the focus group findings will receive a broad and itemized inventory of areas of greatest triangulation confirmation, disconfirmation, inconclusiveness and uniqueness.

Database Searches

In order to ensure that this systematic review is reproducible and all-encompassing, a database search protocol was created for each researcher to follow. First a list of databases to be searched was created (see Appendix A). Then “research type” and “communication type” keywords, terms, and phrases were compiled into lists to be used by all four schools (see Appendix B). In addition, UCLA identified agent specific keywords, *botulism* and *foodborne illness*, to assist in identifying those articles specific to botulism (see Appendix B).

When the database searches were performed, each “research type” search term was combined with the keyword “botulism” in the given database and the number of articles found was recorded. Then each “research type” search term was combined with the keyword “foodborne illness” and again the number of articles found was recorded. The process was repeated with the “communication type” search terms for both agent specific keywords. To document the database search results, UCLA created an Excel spreadsheet with the following column headings: search terms, search database, search

date, total articles found, # articles kept (those that we are considering for inclusion), endnote # for articles kept, and reviewer.

After the initial list of articles from the database search was created, each article with an abstract was then reviewed for inclusion in the verification analysis according to specific inclusion criteria.

- In English
- Related to bioterrorism and/or disasters and/or outbreak of foodborne illness
- About communication with the general public, not epidemiology or medical provision
- Responses should be referring to general public, and not preparedness, official responses, medical responses, or medical facility responses (with the exception of communication responses). Articles about the training of hospital and first responders should also not be included
- Discussion of public perception of government response to a bioterrorism attack, disaster, and or food-borne disease outbreak should be included
- Public beliefs, reactions, perceptions, or knowledge of government and non-government organizations preparedness should be included
- Focus on medical treatment, disease physiology, or highly technical research should not be included
- Discussion of mental effects of terrorism and/or disasters on the general public should be included

Copies of articles that adhered to the inclusion criteria were then obtained. Each article was entered into a verification analysis database, which includes more in-depth information on the research population, methods, and major findings. Comparisons between each article and the results from Year 1 and Year 2 were then completed.

IV. RESULTS

A. Pre-event Knowledge

The literature regarding pre-event knowledge of botulism as a biological weapon is scarce. Most of the articles found in the search pertain to epidemiologic studies of botulism or other foodborne illness outbreaks.

1. Estimation of own risk and risk of others

PEMD: All persons interviewed in the Year 1 focus groups felt that they were potentially at risk. There was a lot of discussion about exactly where a terrorist would most likely strike and who the human targets would be. Many participants believed that they personally would not necessarily be in the line of fire (optimistic bias). A few claimed that terrorist events would most likely happen in the center of larger cities where many persons could be affected. Along those lines, rural residents considered themselves at less risk than those living in urban areas. Concerns were voiced about children and their well-being, as well as about parents. Other concerns that surfaced were for persons who did not understand English. Participants expressed sadness and empathy for the victims of attacks.

Verification Analysis: Redmond and Griffith (2004) elicited feedback from consumers via a survey on attitudes and beliefs about food safety. They found that consumers perceive a low risk of food poisoning from foods prepared at home and believe they are at less risk than other people (optimistic bias). Consumers also exhibit an “illusion of control” over food safety when food is prepared at home, regardless of the quality of food

brought into the kitchen. Therefore, the authors surmised that consumers may not perceive a risk of food poisoning if they believe they are controlling the risk. The majority of respondents perceived themselves to be responsible for their own food safety; however, younger participants and men felt less responsible. Responsibility increased with age and for women. Finally, the authors indicated that these perceptions of invulnerability may cause consumers to think interventions are meant for others rather than themselves.

Gray et al (2002) reviewed the literature regarding risk perception after the terrorist attacks of September 11, 2001. They found that risk communicators provide information in a way that helps people with their fears and empowers them with vital facts. Risk-perception studies have found that as our awareness of a risk rises, so does our fear. Furthermore, as people are more uncertain, the more afraid they become. People are more afraid of risks that are new and unfamiliar and of those that have the potential to effect large numbers of people all at once or in one place, as opposed to those that are chronic, killing people over time. People are also more afraid of a risk if it puts them personally in peril rather than if it threatens somebody else. However, at the same time even when people have a greater fear of risk, they consistently believe that the risk is more likely to happen to someone else (optimistic bias). People are more negative about risks that are forced on them as opposed to ones they choose; they are more afraid of things they have no control over. Importantly, this literature review found that the more people trust those who are perceived to protect or inform them, the less afraid they will be. People pay attention to how those in power act as well as to what they say. The authors suggest that effective risk communication includes presenting the findings of

sound science in a way that addresses people's concerns; therefore, communicators with a greater understanding of risk perception can tailor their messages to help people keep their concerns in perspective. The goal is to help people look at the risk with a more reasonable view and empower them to make decisions, hopefully enabling policies and measures to have more of an impact.

2. Agent knowledge

PEMD: During the Year 1 focus groups, biological agents mentioned were anthrax, smallpox, bacteria and viruses, SARS, West Nile Virus, salmonella and food contamination. Discussed at great length were the different modes of transmission such as person-to-person contact, food, water, air, shared needles, and blood contact. However, different diseases mentioned were not linked to their specific transmission modalities in these discussions. Neither plague nor botulism was spontaneously mentioned.

Generally, knowledge about botulism among those in the focus groups was limited. A few persons made the connection between people becoming ill, eating contaminated food, and an outbreak investigation. Not much was discussed about botulism, except that it is transmitted by contaminated food and water. There was some confusion over whether it is a communicable disease, like the recent SARS outbreak. Still others thought that perhaps botulism could be deliberately spread through an airborne transmission route or via canned goods. Some discussion of symptoms did occur as well as a brief reference to the botulism anti-toxin. However, participants were not clear about symptoms, what treatment entails, or treatment availability and accessibility.

Verification Analysis: Our analysis revealed three studies that discussed pre-event agent knowledge, although only the first one looked at botulism in particular. Chiou et al (2002) surveyed Alaska natives regarding their knowledge and behaviors surrounding cooking methods that put them at risk for botulism poisoning. A majority of respondents knew that botulism was a foodborne illness and most could identify the major symptoms of the illness. A majority knew to seek medical attention if botulism was suspected and thought it could be cured. Very few interviewees knew that an antitoxin was available.

Regarding foodborne illness in general, the USDA released publicity information about a promotional campaign featuring musician Wynonna Judd that aimed to prevent foodborne illness in 2003. During the event Judd and safety experts demonstrated good food handling practices and safety techniques to children and their parents. They also discussed common foods that are susceptible to poisoning. This article detailed educational efforts by a government agency, but did not assess knowledge or attitudes from the audience's perspective.

DiGiovanni et al (2003) performed a prospective study on a simulated community bioterrorism outbreak. Participants were given information in stages and then answered questions about the outbreak. After a release of information through a press conference given by federal authorities and academic experts, only 30% to 35% of all participants correctly identified the accurate mode of disease transmission. Therefore, agent knowledge was low in this study.

3. Confidence in government

PEMD: The main finding from the Year 1 focus groups was that many persons believed that for either natural or manmade disasters, government efforts to stop an event or to respond efficiently to an event would be insufficient.

Verification Analysis: We only found one article that analyzed the pre-event confidence in government aspect of a botulism outbreak. Wein and Liu's (2005) mathematical model of a deliberate botulinum toxin release into the food supply shows that the small number of ventilators and limited supply of antitoxin in the national stockpile would mean a significant death rate. Total medical costs would be tens of billions of dollars. The authors surmise that the current FDA guidelines are not protecting consumers from an attack and that the government needs to instill further protections to keep its citizens safe.

4. Precautionary measures

PEMD: Year 1 research revealed that most participants believe that they need to engage in preparedness activities before an event happens. They had a moderate awareness of general protective actions and behaviors for disasters and emergencies. All participants mentioned stocking up on food, water, first aid kits and basic supplies. Other self-protective measures were mentioned, but there was a lack of specifics about what to get, how much, and where to store it. Participants also did not know about how to protect themselves from specific biological or foodborne agents. For most people, the "shelter in place" concept did not mean staying inside at home, at work, or wherever the individual

happened to be when the event occurred. Instead it was often confused with physically going to a shelter.

Verification Analysis: In their mathematical model of a prospective botulism outbreak in the food supply, Wein and Liu (2005) found that rapid in-process testing of the milk supply for botulinum toxin is cost effective for the government and consumers. Their research also highlights the need to perfect the design and implementation of a near-instantaneous product recall and disposal strategy if the food supply were attacked. They presume that the great potential for cross-contamination and consumer anxiety would mean that the entire milk supply would have to be destroyed. The authors suggest that the US Government invest in prevention by investigating inactivation processes like irradiation that do not effect nutrition or taste, and develop a specific test to detect contamination during milk processing. Furthermore, the authors emphasize that the current FDA guidelines do not protect the food supply.

Chiou et al (2002) found that nearly half of the Alaskan participants interviewed about cooking methods that put them at risk for illness from botulism toxin would be willing to boil their food before eating it. Other recommended behavior changes were acceptable to more than half of participants.

In regard to foodborne illness in general, Shewmake and Dillon (1998) reviewed the literature on food poisoning and found that a common public misconception is that irradiation of food makes it radioactive, although it has been endorsed by the World Health Organization, the American Medical Association, and the American Dietetic Association. The authors emphasize that education of the public is critical in acceptance

of irradiation as a preventive measure and in reducing the incidence of foodborne illness. They feel that that if consumers would accept irradiation, it could be as important a public health measure as pasteurization of milk.

In addition to Shewmake and Dillon, Crutchfield and Roberts (2000) found in their literature review of food safety efforts in the 1990s that consumers interviewed in the FoodNet survey expressed a need for more information about the process of irradiation, and only half of the respondents said they would buy irradiated meat or poultry although it has been validated by scientific research. Crutchfield and Roberts determined that changes in regulations governing food production and responses by food producers have helped reduce the risks from microbial pathogens. The authors also point out that new research and surveillance efforts have helped monitor the illnesses caused by foodborne pathogens and reduce risks to consumers.

Ralston et al (2000) examined the results of the 1996 MRCA and found that about 10 % of the respondents switched from cooking their hamburgers rare to medium; about three-fourths of those who switched cited the possibility of becoming ill as the reason. This study also examined how taste and perceived risk of illness (as measured by a risk motivation index) effect the way hamburgers are prepared. Respondents with a higher measured motivation to avoid getting sick were less likely to cook hamburgers underdone, 5% less likely for a 10% higher risk motivation index. Away from home, respondents with a 10% higher risk motivation index were 9% less likely to order hamburgers cooked rare. The authors claim that these results support the finding that consumers change their behavior due to fear of illness.

Precautionary measures could also include participation in programs aimed at prevention. Corso et al (2002) examined people's willingness to pay (WTP) for prevention versus treatment options for a foodborne illness acquired while traveling abroad. The study found that people view prevention programs as less costly and as an important priority but are willing to spend more money on treatment programs for an equivalent gain in health. Seventy-five percent of respondents stated that prevention programs were less costly than treatment programs; however, respondents reported that they would pay almost three times as much for a treatment scenario than a prevention scenario. Willingness to pay for such programs increased with age and income. The results of the study suggest that treatment is preferred to prevention when asked in the context of willingness to pay. Prior opinions on whether prevention or treatment interventions were effective had a moderate effect on WTP, but opinions about cost had no effect on WTP. The authors say it is unclear why people's opinions and attitudes differ from their willingness to invest in prevention versus treatment. They suggest that willingness to pay may not be a true reflection of preference, that it may reflect opinions about personal benefit as opposed to what is valuable to society.

5. Information seeking

PEMD: Year 1 focus groups revealed that people are familiar with and have experience with foodborne outbreaks. There was general recognition that health departments and the CDC deal with these events. There were long discussions about outbreak investigations, when and how the news would be broadcast, what people should be told, and what people should do.

Verification Analysis: Ralston et al (2000) found that in the 1996 MRCA survey, respondents cited newspaper and TV/radio most frequently (71%) as a source of information on how to cook hamburgers safely. Word of mouth (61%), magazines (58%) and food labels (50%) were also cited. In the 1998 FDA/FSIS survey, food labels were cited most frequently (43%) as a source of food safety information, followed by broadcast media (37%), print media (29%) and cookbooks (26%).

B. Response to Scenario

1. Estimation of own risk and risk of others

PEMD: Regarding the botulism scenario itself, there was some discussion about sources of food that could be implicated. Persons mentioned canned foods and restaurant foods, and there was some debate as to whether the water or food supplies, restaurants or markets were implicated.

Verification Analysis: Chou et al (2002)) found that about three-fourths of Alaska natives with specific food preparation behaviors believed they were at risk for botulism because of current food preparation and eating behaviors. One quarter thought that some people were immune from botulism, although half knew there was no immunity.

Parry et al (2004) interviewed participants who had experienced salmonella food poisoning as well as a control group who had not. They found that people perceived their own personal risk from food poisoning in the home as less than the risk to other people (optimistic bias). Personal knowledge about food poisoning and personal control were

also greater than other people's. Cases rated their personal risk as higher and the risk to other people as lower than those who had not experienced food poisoning. Therefore, personal experience had an impact on perceived risk to themselves and others. Those who had experienced food poisoning in this study were less likely to adhere to optimistic bias than controls most likely because they no longer felt invulnerable. However, optimistic bias did not disappear entirely possibly due to a return to feeling less vulnerable as time went by after the incident.

DiGiovanni (2003) read a bioterrorism scenario to first responders, media personnel, and members of the general public. They found that participants would compete for a vaccine to protect themselves and their families. The media participants in particular responded such that 26% would require a vaccine in order to stay on the job during the crisis. So obviously the perceived personal risk in this group was high.

Aust and Zillmann (1996) found that news reports on a food outbreak with highly emotional victim testimonials fosters perceptions of greater danger to the public than the same reports with unemotional or no victim testimonials. Women showed greater perception of perceived risk compared to men regardless of whether victims in the news stories were portrayed as calm or emotionally upset. Thus their perception of risk to themselves and others is higher than men in general.

Griffin et al (1998) found that after a cryptosporidium outbreak in the water supply, perceived personal risk was related strongly to feeling worried about the risk and to having contracted the illness during the outbreak. The authors surmised that people who felt worried also believed they would be vulnerable if the parasite reappeared

because they lack trust in the systems that are supposed to monitor the community for this risk.

Ralston et al (2000) found that in the MRCA survey, experiencing a foodborne illness raised a respondent's risk motivation index by 34%, the highest of any factor.

2. Information need

PEMD: In a botulism outbreak, people said they needed to know what foods were contaminated, how they could protect themselves, and that an outbreak investigation was going on, before they could relax. Throughout all of the focus groups, participants expressed a great need for as much information as possible, which is a very normal response in the context of a disaster or event that affects a large segment of the population.

Verification Analysis: Kittler et al (2004) found that among people who used the internet between 9/01-12/01 to find information on anthrax or bioterrorism, 54% did so because they wanted more information than they were getting from other sources, 63% looked for information on the risks and protection from catching anthrax.

Rizo et al (2005) found that internet users expressed interesting in using the internet to find out about patient education materials (84%), to get info about the status of their clinic appointment (83%), to send feedback to the hospital about how to improve its services (77%), to access screening materials to find out if they were exposed to SARS (77%) to renew prescriptions (75%). Some participants wanted to use the internet to access their health records, participate in virtual support groups, and to find information on drug compatibility.

3. *Information seeking*

PEMD: Following the Phase I description, participants mentioned mass media, including local television stations, local radio stations, national television and radio stations, and the Internet. People would turn to local stations first, as it was perceived that they would cover the story first. However, once it got onto national news, CNN, ABC, NPR, BBC and CBS were cited. For radio, local stations were preferred due to speediness of response. However, once the national stations had picked up the story, persons would turn there as well. Internet was mentioned more often than the Emergency Broadcast System, which reflects the growing popularity of this communication channel for breaking news. No specific internet sites were mentioned.

The other main sources of information were community-based health, religious and first responder organizations. There was little mention of elected politicians or physicians. A few persons mentioned that they would seek information from multiple sources, including mass media and interpersonal networks. Finally, participants mentioned the newspaper as another source of information.

Following Phase II of the scenario, media choices expanded somewhat as well as individuals' rationales for using them. Participants stated that they would still turn to the television and radio stations for breaking news, as well as police, fire and Red Cross sources, but a number of persons now mentioned hospitals and the public health department as additional sources of information. Participants said they would go to newspapers and the Internet for more in-depth information. Types of internet sites

mentioned were governmental and university sites that deal with bioterrorism. A number of persons mentioned the CDC website as a good place to go for information.

After Phase III, participants continued to seek information from the same sources already mentioned, but at this time they were also interested in places and organizations that might hold briefing sessions, town hall meetings, or community-based forums. Examples of places mentioned were schools, Head Start programs, and churches. The idea was that health department officials, hospital personnel, first responders, university experts, or other local authorities could debrief neighborhoods about the issues. Again politicians and elected officials were not specifically mentioned as reliable sources of information.

Verification Analysis: DiGiovanni et al (2003) found that during a simulated outbreak, before the disease was identified many participants wanted health information from local public health authorities. Second to government representatives were personal physicians. After the disease had been identified, participants didn't identify a single source for information, but small groups chose the head of the federal team working at the outbreak site, the President, and a physician from a federal agency as reliable sources of information. Many participants also emphasized a need for information from local leaders including government and nongovernmental officials.

Kittler et al (2004) found that during late 2001, respondents received very little information on anthrax and or bioterrorism from physicians, although this was the most trusted source of information. Only 4% reported receiving information in person from their physicians on anthrax. Just 1% reported receiving information about anthrax

through the mail from their physician. Only one respondent reported receiving an email from their physician on anthrax. Only 12% reported obtaining a lot of information from health websites, the next most trusted source after physicians. Although TV shows and news reports were the least trusted source of information, more people (51%) reported receiving a lot of information from this source than from any other. Twenty-one percent of respondents looked for bioterrorism information on the internet between 9/01-12/01. Among this group, 65% found useful information by searching for the words “anthrax and bioterrorism,” and 40% utilized online newspapers, 25% private health websites like WebMD, and 26% public health websites like the CDC’s. Those who used the internet tended to be white, female, and well-educated. Those who reported lower levels of computer use and internet access tended to consider themselves in poor or fair health. Thus the authors hypothesize that the people most at risk for becoming ill from a biological agent may not utilize this information resource.

Kahan et al (2003) found that 60% of the respondents to their survey following the anthrax scare of 2001 preferred their family doctor as the major source of information on prevention and care following a biological threat whereas 14% would turn to a representative of the health department, 10% to the media, and 9% to a government defense force official.

Rizo et al (2005) found that during the second outbreak of SARS in Toronto 91% of patients surveyed were aware of the internet, 70% used the internet by themselves, and 57% with the help of a friend or family member. Sixty-eight percent of internet users during the second SARS outbreak in Toronto had already searched for health information on the web before visiting a health clinic. Furthermore, 75% were interested in using the

internet to communicate with health officials as part of their ongoing care. Users younger than 40 years old were much more likely to be interested in communicating with health professionals via the internet than those 41-60 years old. However the older groups had higher odds of communicating about non-urgent matters over the internet. All internet users with college education were significantly more likely to be interested in services provided through the internet than those with a high school or elementary education. There were no significant differences for gender. Overall, younger age, higher education, and English as a first language were predictors of interest in using the internet during an outbreak.

Griffin et al (1998) explored media use for information after a cryptosporidium outbreak. Most of the respondents' exposure to mass media appeared to be related to routine or habitual use of these media in general. Only those respondents who expressed a greater personal sense of worry actively sought information about the outbreak from mass media outlets like radio, TV, and newspapers. In general, those who expressed a greater personal sense of worry sought information from mass media and specialized media as opposed to relying on family and friends. Minorities rely more on information from specialized media like health professionals, government agencies, and pamphlets/brochures than other ethnic groups and lower SES respondents rely more on discussions with family and friends for their information.

4. *Information belief*

PEMD: People felt some local news reporters were credible but did not always trust the media, as it tends to sensationalize events.

Verification Analysis: In DiGiovanni et al's (2003) study on reactions to a simulated outbreak, participants did not want information from federal authorities only. Most wanted additional information from local public health authorities and 48% to 75% wanted information from both government and nongovernmental sources.

Kittler et al (2004) found that in response to the anthrax scare of 2001, respondents trusted health information from their physicians more than from other sources. Health websites were also deemed reliable followed by public radio, newspapers, online news sources, TV shows, news reports, magazines, other people, and other radio sources, in decreasing order of trust. The authors hypothesize that since physicians are highly trusted sources of information they might be good resources for delivering reliable information to a large population. They suggest that physicians could email public health information to their patients, including validated websites like www.cdc.gov for more information.

Ralston et al (2000) found that respondents who said they get their information from magazines, television, cookbooks or government hotlines had a 15% to 17 % higher risk motivation than those who did not cite these sources of food safety information.

5. Exposure to the Event

PEMD: Not a great deal was said about the medical symptoms, treatment issues, or medical consequences for persons stricken by botulism. In regards to the medical aspect of the outbreak, some participants assumed that presenting at the hospital would be helpful to the investigation. Others took a very dim view of going to the hospital, which

may reflect the current dysfunction of large urban emergency systems as well as the fear of getting sicker from secondary infections.

Verification Analysis: Kittler et al (2004) found that in their survey of information seeking behaviors immediately after the anthrax scares in 2001, 58% of those searching online for information on anthrax and bioterrorism changed the way they handled their mail, and 65% reported that they washed their hands more often as a result of the information that they found. Therefore, the authors hypothesize that the internet has the potential to help successfully manage a public health emergency.

Kahan et al (2003) found that in preparation for an anthrax attack after the scare of 2001, 16% had their gas masks inspected, 4% had filled their monthly prescription for a chronic treatment in advance, 3% had stored extra food and water, and 2% had asked for prescriptions for antibiotics known to treat anthrax. However, none of the survey respondents reported that they were currently visiting a clinic due to tension following the scare or to seek information on anthrax.

In the 1998 FDA/FSIS consumer survey, Ralston et al (2000) found that 68% of respondents had heard of the 1993 Jack in the Box food borne illness outbreak. Of those, 27% said the incident had affected their behavior. Also, 40% of respondents had heard of a recall involving Hudson Foods, and of those 25% reported changing their behavior as a result of the news coverage.

Stein et al (2004) found that in biological events, some studies suggest that the greater perceived threat of exposure is likely to stimulate more sustained emotional and

behavioral consequences. Behavioral changes may include large numbers of people from nearby communities seeking medical care for real physical complaints and for screening.

6. *Reactionary behaviors*

PEMD: Initial actions that participants would take in response to the first scenario may be categorized into the following types of responses. The majority of persons said they would “stock up” on supplies including food, water, first aid supplies, batteries, and gas. The implication was that they were prepared to stay in their homes. A second group of persons said that they would seek a way to leave town. A third group said they would “wait and see” what the experts told them to do before taking action. A number of persons said they would call family members or make sure their children were safe. Many mentioned seeking up-to-date information. A few persons mentioned that in addition to one of the other responses, they would also pray.

Finally, there were a few persons who believed that nothing could be done once an attack had occurred. Thus among some individuals, the response was one of helplessness, or the notion that if an attack came there wouldn't be that much that one could do.

When the final scenario rolled out, in which the condition of botulism was confirmed and assurances were made that an outbreak investigation was underway; actions that persons spoke about continued to echo prior responses. A small group continued to suggest they would leave town, but the tone of the responses had softened considerably to being more of a joke than a serious consideration. An assumption that many persons seemed to make after the initial panic was that the outbreak seemed to be

contained as new cases were not presenting. There were still a number of voices that called for moderation in responses until a more comprehensive report was released. A number of persons said they would search for more information about the outbreak and the persons who were victimized, in order to try to understand possible sources of the outbreak. There was still a great deal of concern about panics and a mass exodus, but a number of participants suggested that it was important to remain calm and listen for the information.

The biggest concern continued to be knowledge about whether food or water was safe to eat. Long discussions took place about how one might be sure about the food being eaten and what symptoms were indicative of botulism

Radio: Instrumental actions aimed to increase safety and assure survival such as boiling water, cooking food, not letting children eat and drink possibly contaminated food, and not going to the store. Affective actions had to do with sharing information, assuring others and getting re-assured, making sure that others were informed and safe from harm. Here persons said they would call relatives, call the doctor, call the emergency room, and go to the emergency room.

Barriers to actions recommended: crowded hospitals, jammed phone lines, lack of belief in the information given, information missed, lack of access to computers, and no cooking thermometers, confusion about symptoms, because the symptoms mentioned were similar to many other conditions.

Television: As in the response to the radio clip, actions were divided between those had to do with family obligations and communications, or affective responses, and those that were more instrumental in nature. Persons seemed to latch on to the issue of

boiling water and using bottled water as something that was straightforward and easy to do. They also would seek out more information, shelter in place, and most said they would be on alert for more updates. There was some ambivalence expressed about boiling all foods, the issue being at what point this becomes no longer necessary or possible.

As for radio many barriers to carrying actions were voiced. This included having too much water to boil, not having food thermometers, fear that the website might crash or that phone lines would be jammed if this type of event really occurred. Another concern that surfaced was the fear of being charged money for visiting the emergency room, especially if one did not have health insurance. Most of all, persons were not convinced that actions suggested would keep them safe if there was an airborne release of the botulism toxin.

Fact sheet: There were two basic types of views expressed about actions suggested by the fact sheet. On the one hand persons expressed that they would find it easy to comply with directions given. In contrast the other perspective was that there was not enough information given and persons would double check with others before doing anything.

Verification Analysis: Kahan et al (2003) found that 64% of the respondents to their survey following the anthrax scare of 2001 would seek treatment from a family physician if they were worried about an attack or the media communicated that an attack was in progress, while 30% of the respondents preferred a hospital emergency department.

Ralston et al (2000) found that in the 1996 FMI survey, 59% of respondents had seen the new food safety handling labels on meat and poultry and of those 43% said the labels caused them to change their behavior. In the 1998 FDA/FSIS survey, only 11% had seen the labels, but of those 29% said they had changed their behavior as a result of the label.

7. Emotional and psychological responses

PEMD: The most common emotional responses were fear, anxiety, distress, nervousness, and helplessness. A commonly voiced theme was the fear that the stress of not knowing much about the situation would cause the participants or others to panic. Participants also expressed sadness and empathy for the victims in hypothetical scenarios described. While participants were grateful for information they had gotten, not knowing everything about the event made persons edgy and concerned. A number of persons also said that they would feel a need for prayer in these circumstances.

After the final part of the scenario was disclosed in which the type (botulism) but not the exact source of the toxin was confirmed, respondents noted that some of their fears were allayed. This was both because the type of illness was confirmed and because claims were made that authorities were working to resolve the issues.

Verification Analysis: Mann et al (1981) found that patients recovering from a botulism outbreak reported a fear of choking months after they had recovered. Depression was also an issue that arose as a major problem as they tried to cope with the unexpectedly

persistent symptoms. In each instance, depression was related to the lengthy convalescent period.

Kahan et al (2003) found that 66.5% of respondents to a questionnaire given after the anthrax scare of 2001 reported no tension due to the anthrax threat, 8% felt uneasy, and 24% were worried.

Aust and Zillmann (1996) found that the more empathically sensitive respondents showed greater distress to emotionally laden news stories about food poisoning and would perceive greater risk of victimization and to others and self compared to those with low sensitivity. Women also scored higher on the empathic sensitivity scales than men.

Gray et al (2002) reviewed the literature about risk perception since the 9/11 attacks. In one poll, 59% of respondents said they had experienced depression, 31% had difficulty concentrating, 23% suffered insomnia, and 87% felt angry.

Lopez-Ibor et al (1985) found that in reaction to a food poisoning outbreak, some patients developed a “reactive syndrome.” More than 2/3 of the patients showed anguish, anxiety, sadness, and depression; more than half showed irritability and insomnia; and 20-30% showed loss of short-term memory and concentration. Those who showed symptoms of the psychological syndrome tended to be female, lower SES, and have a previous history of nervous disturbances or disorders. The authors confirmed findings from other studies that showed symptoms of the same nature. So they concluded that it is the experience of disaster itself not the specific type of disaster that is important. The authors found that a local newspaper declared that all syndrome victims were hopelessly condemned to death. The effect of this news report was increased stress on both patients and people not affected by the poison but prone to hypochondria, phobia, and other

paranoid reactions. They also found that failures in public health communications with the general public led to an increase in alarmist attitudes.

Stein et al (2004) reported that the U.S. Department of Defense estimates that an attack from a chemical, biological, radiological, or nuclear weapon would produce five psychological casualties for every one physical casualty, with a range from 4 to 1 to 50 to 1. They also comment that the emotional reactions can be anything from fear and anxiety to a full-blown psychiatric disorder. One study found that as many as two-thirds of those directly exposed to mass violence are psychologically impaired to some degree with such things as PTSD, anxiety and depression. Reports on reactions to people affected by botulism suggest that anxiety and depression are likely. In biological events, some studies suggest that the greater perceived threat of exposure is likely to stimulate more sustained emotional and behavioral consequences. Behavioral changes may include large numbers of people from nearby communities seeking medical care for physical complaints and for screening. Some reports suggest that children may be a vulnerable population for developing emotional distress and other adverse behavioral consequences of terrorism. Several of the experts interviewed emphasized the importance of communication directives from local authorities in addition to the national sources that are likely. Other experts suggested that we need to understand how subgroups of the population will react to terrorism and that relationships with community groups would be important for education, information dissemination, and support.

Alexander and Klein (2003) performed a literature review of biochemical terrorism reactions. Community reactions to terrorism varied. One article found that there are three stages of major trauma: initial response, recoil phase, and post-trauma. During

the last phase, survivors are likely to elicit emotional reactions including depression, anxiety and anger. Another study pointed out the collective coping mechanism of sharing views immediately after the event, followed by inhibition and self reflection. Panic is also a likely response that is acute and intense. It is also contagious and means that people tend to look after themselves first and foremost. Several studies challenge the negative views of community reactions and advocate that the general public is likely to be more adaptive and take collective action. Therefore, the authors recommend that community organizations be involved in planning and execution of public health operations. The authors also surmise that a terrorism incident is likely to have more chronic medical, psychological, social, and political effects as witnessed in the Sept 11 and Bali terrorism incidents. Individual reactions will vary as well but will most likely include stunned and numb, anxiety and fear, horror and disgust, anger and scapegoating, paranoia, loss of trust, demoralization, guilt, and false attributions. Of particular interest in terrorism incidents is the possibility of Mass Psychogenic Illness. The authors reported that after a radiological contamination event in Brazil, 5000 people who had not been contaminated sought medical attention for symptoms of acute radiation sickness. The authors point out that this syndrome is of concern to the medical and welfare agencies who may become overwhelmed by the number of people seeking their help. For individuals, psychiatric afflictions such as acute stress disorders, PTSD, depression and pathological grief were found to be quite high following some terrorist incidents. One study cited by Alexander and Klein reported that 34% of 182 survivors of the Oklahoma City bombings developed PTSD and 11% developed other conditions including depression and substance abuse. Their lit review also found that after Sept 11, a random digit dial survey found that 44%

of respondents reported at least one symptom of stress and 35% of children had one or more stress symptoms. Intervention methods, such as quarantines, restricted travel, and decontamination, may also have psychological impacts on the public. The authors contend that not all psychological outcomes are negative after a terrorism incident. Many studies found that following involvement in a catastrophe, communities will most likely be more united, with individuals finding new strengths, closer relationships, and revised life priorities and values.

8. *Any other outcomes related to scenario response*

PEMD: Some participants likened the botulism scenario to other food contamination issues, such as salmonella, poisoned Tylenol, or bad lots of food from processing plants. Other issues that arose included how long the investigation would last and what one would do if the source of the outbreak was not immediately clear.

Verification Analysis: Spake et al (2001) reviewed the public fears and anxieties following the anthrax outbreak in 2001. They found that some health departments do not have basic equipment like computers, and internet access needed to communicate with government and media outlets during an outbreak. A botulism vaccine developed years ago is no longer available. New versions are years away. Medical personnel are not being adequately trained to handle an attack. They found that doctors and nurses are often called upon to treat these diseases without prior experience. Symptoms are often common or easily confused with other diseases making it extremely difficult to recognize an outbreak.

Parry et al (2004) found that optimistic bias about perceived vulnerability to food poisoning is lower in people who have experienced an incident in their household. Since optimistic bias often adversely affects public health campaigns but is reduced in these households, this may be an opportunity for people to receive messages about behavior change. Those who experienced an incident were more likely to see thorough cleaning and cooking as protective than control participants. They were also more likely to list consumption of risky foods as hazardous behavior than controls.

C. Confidence/Trust in Government

1. Confidence in Government

PEMD: Federal and local government agencies were seen to be responsible for emergencies, both in regards to preparedness and response. To some extent, participants asserted that sufficient systems are in place. Many persons expressed the belief that if another terrorist event happened, systems are now in place so that there would be information, hotlines, tip sheets and other public communication services to address public questions and concerns. However, there was also a great deal of cynicism about local government, and concern that elected local officials are often not particularly accountable to their electorates and have a tendency to be absent, lie, and cover up their actions or inactions.

Verification Analysis: Spake et al (2001) found that some health departments are lacking essential equipment to communicate with government and media outlets. In the anthrax scare, telephone systems were overloaded and public health officials were not able to

communicate with each other or the public. There is currently no database of symptoms that may reveal community or statewide disease patterns to help recognize outbreaks and facilitate treatment processes. Surveillance and disease diagnosis requires trained personnel and lab facilities. Some states have only one lab or none at all that house equipment necessary to do proper testing. CDC scientists are already overtaxed with the demand for testing and surveillance. Money is not available to open new labs or train personnel properly. Hospitals may not be ready to handle the surge capacity of a large-scale outbreak and federal stockpiles of antitoxins may not be able to meet the demand of an outbreak in a large metropolitan city. Too little money has been allocated to health departments to plan and coordinate responses to future outbreaks. Neither Iowa nor Texas had received funding for local planning. Some public health officials are not being included in planning exercises and local preparedness. The role of public health in preparing for these scenarios is not well-defined.

2. Information belief

PEMD: More credibility was given to federal and first responder communications than state or political communications.

Verification Analysis: Crutchfield and Roberts (2000) found that although scientific evidence shows that irradiation of food is safe, few retailers offered irradiated foods for sale because retailers are concerned that consumers would not buy them. Surveys of consumers in the FoodNet survey said that only half of respondents would buy irradiated

food. The most common reason cited for unwillingness to buy was “insufficient information” about irradiation safety.

Shewmake and Dillon (1998) reviewed the literature on food poisoning and found that a common public misconception is that irradiation of food makes it radioactive, although it has been endorsed by the World Health Organization, the American Medical Association, and the American Dietetic Association. The authors emphasize that education of the public is critical in reducing the incidence of food borne illness. They also indicate that if consumers would accept irradiation, it could be as important a public health measure as pasteurization of milk.

3. Any other outcomes related to confidence in government

Verification Analysis: Crutchfield and Roberts (2000) reviewed the literature on food safety initiatives in the 1990s. In May 2000 the USDA launched two initiatives to educate the public and increase awareness of safe food handling. Food safety messages were also incorporated into other diet education efforts. The authors surmise that education efforts have increased public awareness and enabled consumers to protect themselves from foodborne disease.

In 2003, The USDA Agency Group 09 released a publicity report on a public education event featuring musician Wynonna Judd and the USDA’s Food Safety Mobile (2003). The vehicle is featured in a nationwide tour to educate consumers on the importance of handling food safely.

D. Response to Media Materials

1. Information needs

PEMD: Lack of information or a vacuum seemed to give rise to speculative thinking with regards to who was responsible for an attack and it can also give rise to racism, prejudice and stereotyping. There was also a general concern voiced, especially by groups who were not native English speakers, about broadcasting information about the event in multiple languages.

Radio: First and foremost, it was suggested information needed includes symptoms described very specifically and disease consequences or what to do about them. The radio clip seemed to raise questions in at least three different domains. First persons wanted to know information that was immediate and linked to their own actions and survival. A second set of questions has to do with the meaning of the event, and include questions about the origins, etiology, and transmission and health consequences of the threat. A final set of questions raised has to do with being assured by asking what the authorities know and are doing about the outbreak.

Television: Many said the video tried to give too much information in too short a time. Some people had difficulty following all the visuals and processing information at the same time. Presenting a great deal of information about health for an intentionally caused botulism outbreak in a three-minute video exposition evoked many more unanswered questions than could be addressed. Categories of questions raised were variants of those that were raised after the radio clip, with more emphasis on prevention and transmission than symptom recognition.

Fact Sheets: At this point however the questions asked for more refinement and qualifications in the information. The types of questions at this point fell into two categories: 1) those of survival and 2) those of meaning.

2. *Information seeking*

PEMD: Participants mainly stated that they would get information about an attack from the news media, whether local television or radio. Other sources of information mentioned were newspapers, the internet, the library, and first responders. Also noted was the need to stay informed through various news channels, and the importance of having readily accessible knowledge, both before and during the attack, regarding the type of agent or vector used.

3. *Information belief*

PEMD:

Radio: Focus group participants were split on the credibility of radio clips pre-tested. Listeners suggested that the more urgent the tone of the announcer, the more they would be likely to listen. Transmission was more abstruse concept and fewer persons processed it, especially as this was the first time anyone had suggested that it could be spread through the air. Some persons had never heard of botulism.

Television: Audiences were split about the overall credibility of the television clip in its current format for conveying important information about a terrorist event. On the positive side respondents felt that this was the type of information that they would like to get from TV. Some persons also thought the spokesperson was quite credible and

enhanced the television clip. On the negative side many respondents felt they needed to have a stronger message convincing them of the utility and relevancy of carrying out the actions. They were not convinced that what was suggested was linked to their survival. Many suggested that the spokesperson was too calm, not assertive enough and too positive in her demeanor to convey the urgency of the situation. Another critique was that there were too many visuals going on at once so it was hard to focus on the main message.

The more educated and acculturated groups of respondents who were the most critical of the television materials. The issue for most was how serious the broadcast was. As the prototype was not exactly a news format, persons had some difficulty in trying to assess what it was. Thus a basic suggestion was this information needed to be embedded in the regular news or a news bulletin, so it would be clear how serious it was. So part of the issue of credibility had to do with the format itself, which at times seemed like the news, but also seemed to many like an infomercial.

Fact sheet: Most persons queried felt that some adjustments to the fact sheets could make them credible. First and foremost it needed to be in a format that looked “official” such as a pamphlet or flier. Then it needed identifiers such as logos, letterheads, etc. If it was distributed to many different types of places or agencies it would be more credible. Finally it was suggested that if it were short and to the point it would be more credible. There were many recommendations for improvement of the fact sheets. In regards to the content participants suggested simplifying the presentation, prioritizing the information, including essential information

4. Message content

PEMD: The more specific the information released, the more it allayed fear or panic.

However, some participants who heard the final scenario read about victims and treatment still wanted to know more, such as what foods were contaminated, how they could protect themselves, and that an outbreak investigation was going on, before they could relax.

In Phase I, the questions were very basic and revolved essentially around three issues: 1) protecting self and family; 2) trying to understand the seriousness of the threat; and 3) determining who was doing what. Questions that came up included:

- 1) Protecting self and family: What can one do? How does one prepare? What should one do about ones children? What is the school policy (if have children there)? Which places are safe? Where is the threat?
- 2) Trying to understand the seriousness of the threat: What happened? What is the agent? Who is affected? How is the illness transmitted? Where is it coming from? Where is it centered? How widespread is it so you can get away from it?
- 3) Determining who is doing what: Where did it came from? Why did it get here? Who was responsible for the attack? What are the authorities doing about it? How can you counteract it?

By Phase II of the scenario, the questions were more specific to botulism, as the scenario specifically spells out that this agent is suspected. Questions centered on understanding the illness and symptoms, transmission, and what could be done to prevent the illness

With the roll out of Phase III, the nature of the questions shifted once again. Here the issues were not of personal survival as after Scenario I or of epidemiology as after Scenario II. Rather, issues centered on the nature of emergency response systems, the role of community organizations and schools, how the emergency broadcast system would work in such a case, and which agencies were responsible for what.

In year 2:

Radio: The clearest set of messages heard was the description of symptoms of botulism followed by information about medicine or an “antidote”, the importance of seeking treatment, heating foods and boiling water, and that there was a hotline and a website that could be accessed for more information. A substantial minority attributed their uneasiness about their inability to do anything as due a lack of specific information about actions to take conveyed in the radio clip.

TV: Themes that participants were most likely to mention were about the medical consequences of ingestion of the *botulinum toxin*, including symptoms, the antidote, incubation period and whether it was contagious. The next set of issues recalled were those of treatment, including what it was, where to go, and the fact that hospitals have the antitoxin. While level of recall of information was high, there was much information concerning botulism that was unclear to participants, especially whether botulism is contagious: suggesting that persons could be exposed to the toxin if they touched contaminated clothing of other persons made people think it was contagious. Other concepts that proved difficult to convey were transmission and curability. Transmission was confusing because of the notion that the toxin can be aerosolized. This suggested to

some that it was airborne and infectious. For others the issue was the multiple routes of transmission. As well the concept of curability was also not clear. Materials suggest that the antidote is a treatment which is interpreted by some as a “cure” even though materials also said the antidote was not a cure.

Fact Sheets: The major ideas recalled were the definition of botulism, its symptoms, where to go to be treated, the importance of early treatment, and the recovery process. Also cited were how botulism can be used in terrorism, there is no vaccine, what to do to keep you safe, and who to call. Finally specific actions taken to keep oneself, ones family and pets safe were also recalled. Despite increased knowledge about this condition, there were still a number of areas of confusion and ambiguity for participants in response to the written materials. Areas that were difficult to explain in radio and television scripts became more confusing by the time the information was on a fact sheet. Terms used such as “no cure,” “no vaccine,” and “recovery is complete if treated” seemed to create more confusion than clarity, as the concepts seem to be contradictory.

The first main area of confusion was the issue of contagion. The botulinum toxin is typically ingested. However if it is distributed through an aerosolized delivery method, it is conceivable that it can contaminate skin and surfaces, and a person could come in contact with it by touching other person or their clothing or objects that have been contaminated. Due to lack of information about aerosolized botulinum toxin, it is unclear whether it can be breathed in. These ambiguities in the “science” of the use of botulism in a terrorist scenario produced causing a great deal of confusion for respondents who could not quite fathom why it was called non contagious, if it could be caught by touching other people or distributed through the air.

This gets back to a more basic confusion about the nature of botulism. It became apparent in analysis of the data that persons did not realize that botulism was caused by a poison rather than bacteria. Why? In analysis of findings it becomes clear that many persons do not know what a toxin is. Based on CDC input we had taken out many of the references in the materials to botulism being as type of food poisoning, which was the emphasis in the original materials tested in Year 1. Taking out references to poison as the mechanism of illness causation created a great deal of misperception about what botulism really was. Many thought of it as a bacterium.

This misperception leads right to the other point of confusion: the issue about curability. Essentially it was claimed in the fact sheet that while there was an anti-toxin, it was not a cure, however if treated early enough recovery could be complete. These concepts proved to be quite difficult to communicate, as there already was confusion about the nature of the disease: persons thought of the disease as infectious, and similar in nature to a virus or bacterial infection. Finally it was never clear to persons reading the materials exactly what the outcome of treated botulism is. To many, the recovery process was not clear. This may again be a reflection of experience with other more chronic illness or injuries. The notion of paralysis may make persons think about stroke or spinal cord injuries where there is long term disability.

Verification Analysis: In Becker and Popkin's (1992) study, camp directors insisted on getting accurate information out to parents and media as quickly as possible to prevent panic and an escalated situation. A follow up letter was mailed to parents to reassure them that the camp had honestly and effectively handled a health problem.

DiGiovanni et al (2003) found that during a simulated outbreak journalists reacted with more fear, demanded vaccines to stay on the job, and had the poorest understanding of the medical issues associated with the disease outbreak, and were most likely to stay away from work after terrorism was recognized. So the media may not have been good conduits of information in an actual event because of their inaccurate information and personal fear.

Gordon (2003) performed a media analysis of different foodborne illness prevention messages. He found that risk-stimulating, risk-reducing, and self-efficacy statements accounted for 10.2% units of analysis. Furthermore, risk-stimulating statements appeared 7.5% of the time, risk-reducing appeared 2.3% of the time, and self-efficacy accounted for only 0.4% of the statements. The author surmised that food borne illness prevention messages should be stimulating risk and self-efficacy to increase the likelihood that people adopt safe food-handling practices. Therefore, the fact that risk-stimulating statements occurred more than three times as often as risk-reducing statements is encouraging. Government sources of information were more than two times as likely to include these statements as private sources. In contrast, private sponsors of the materials were more than two times as likely to include risk-reducing statements as governmental sponsors. Self-efficacy statements were not included in most of the materials. Much literature supports the idea that self-efficacy is an important factor in preventive health messages.

Ralston et al (2000) found that consumers are receiving food safety messages from a variety of sources. In 1995, FSIS began requiring safe handling labels on raw meat and poultry. Supermarket chain and local health authorities also worked together to

produce brochures and materials that draw attention to these labels. The Partnership for Food Safety Education also began a campaign to fight bacteria in foods. The media also publicizes food borne outbreaks and recalls of contaminated foods.

5. *Perception of coverage*

PEMD:

Radio: There was some ambiguity about radio messages. People were not completely at ease listening to radio messages. For many, the radio clip format was simply too fast for them to absorb all the information conveyed. This was especially true for disadvantaged populations, who remarked that the announcer needed to slow down and to repeat important information. The language used was also hard to follow. The results may have less to do with the quality of the broadcast than people's lack of familiarity with getting information verbally. For some people radio was sufficient, but for others it was not their first choice for information seeking.

Television: Despite criticisms of some of the elements of the television clips generally the response was positive to television materials. Most appreciated especially with low literacy audiences were the depictions of what to do. There was recognition that an image depicting suggested actions was more memorable than words alone. A large group of persons found the symptom enactments poorly done and not believable. This was not true for the enactments of preventive actions and treatment response which were viewed positively. The outcome is that symptoms, if depicted at all, should be animated, not live shots.

Verification Analysis: In Becker and Popkin's (1992) study, camp parents responded positively to the director's letter and the media coverage that showed the camp staff had the situation under control. This was measured by the extremely small number of campers who cancelled their reservations for the next camp season.

Aust and Zillmann (1996) found that respondents' perceptions about news stories on food poisoning varied according to their empathic sensitivity and to the way that victims were exemplified in the stories. Victims that were portrayed as emotionally upset led to greater perceptions of personal risk, problem severity, and problem proximity than those portrayed as emotionally calm. The authors hypothesize that broadcast journalism can affect the way that a food poisoning outbreak is perceived based on the type of sound bites they include in their stories.

Alexander and Klein (2003) reported that individuals are more influenced by their own perceived outcomes than in statistical probabilities portrayed in media coverage. Also people respond more to case studies of individuals who were affected than to statistics. So the authors recommend that the media can better educate the public with these images and stories on real people and perceived outcomes.

6. Any other outcomes related to media materials

PEMD:

Radio: Clips elicited many negative emotions. Respondents noted that listening to it made them feel nervous, anxious, scared, vulnerable, concerned for their children, worried, tense, uneasy, stressed, resigned, shocked and confused. On the positive side, once the official information had been released, people said that the information

reassured them that the situation was under control and that officials were working to solve it.

A minority of persons believed that this type of information could foment a panic, a common misperception about disasters and warning systems. Most of the respondents expressed confidence in their ability to take some actions. However some persons lacked the confidence to comply because of their own personal situation. Persons who were disadvantaged, lived in rural areas, or did not have the language skills were more likely to feel this way.

Television: Persons viewing the television clip felt similar negative emotions as they did for radio, but they were less vocal than for the radio clips. Emotions described were anxiety, fear, cautiousness, alarm, helplessness, and denial. Pictures of children made respondents at once attentive and also fearful. As in the earlier example with the radio clip, hearing explicit instructions of what to do seemed to counter negative emotions stirred up and helped persons feel less anxious, more confident, and more empowered. Television: Most persons expressed confidence that they could carry out the actions suggested especially if it would save their lives.

Fact sheet: Two types of emotions were noted in response to the fact sheet: emotions that an actual event would evoke and emotions the flier itself evoked. In regard to emotional responses to a terrorist event, a few persons expressed a positive view that they could cope better with such an eventuality in light of the materials presented. A large majority seemed to lack some confidence as regards dealing with an actual botulism outbreak, even though they had the information, because they were still somewhat confused as to what to do, especially if there was “no cure”.

E. Media Consumption

A. Information seeking

PEMD:

Radio: Many persons would seek out more information via television, the internet, or through local authorities.

B. Perception of media coverage

PEMD: Some participants worried about the veracity of information transmitted by the news media.

Verification Analysis: Spake et al (2001) found that rumors and inaccuracies were reported as fact in the anthrax scare. Federal health officials often contradicted each other and well as their own previous statements. It wasn't until three weeks in the crisis that federal officials put together a national teleconference to correct misinformation and provide facts.

C. Exposure to media coverage

Verification Analysis: Becker and Popkin's (1992) study on a salmonella outbreak at camp was covered on the front-page of local papers as well as on TV stations. As reporters learned about the outbreak, the directors permitted them to film at the camp with the hopes of a balanced and fair story. Other news media picked up the story so directors were forced to send out a letter to all camp parents telling them that the situation

was under control. A TV station as far away as Miami interviewed a local parent whose child was attending the camp. Directors insisted on getting accurate information out to parents and media as quickly as possible to prevent panic and an escalated situation.

Ralston et al (2000) found that in some consumer surveys food safety education messages and media coverage of food safety issues contributed to their shift in hamburger cooking behavior.

Alexander and Klein (2003) found in their literature review of biochemical terrorism that the media can be a source of rumors and misinformation. One study found that children may be adversely impacted by the media coverage particularly if they were personally affected by the incident.

V. DISCUSSION

The literature that we were able to identify can not be easily codified or classified nor does it present a very coherent view of cognitive, cultural, communications or emotional responses to foodborne illnesses or outbreaks. It is a scattered and undeveloped area of research that represents many fields.

As regards people's awareness and knowledge about foodborne illnesses or outbreaks either hypothetical or real there was some agreement about the lack of knowledge in both our studies and the literature we found. Botulism is not a well known condition among the general public and few people know what the symptoms are, how it is caused, how to prevent it or what the treatment consists of. In reviewing related literature we find that this is true for most foodborne illnesses. People are unclear about the origins, etiology, symptoms, disease pathology, and treatment implications of most

foodborne illnesses or conditions that are spread by contaminated conditions that are found in developed world contexts. This may be a result of much improved hygiene and food processing systems in developed world contexts where these illnesses once common – are now rare. However foodborne illnesses have not disappeared and outbreaks linked to E. coli, salmonella, listeria, and Hepatitis A are not unknown.

There was little research found in regard to social or cultural differences – that is not a well developed area in regards to foodborne illnesses although we know from the disaster literature that more socially disadvantaged persons are more likely to miss out on disaster warnings, have less knowledge, be less able to take actions recommended. Disadvantaged populations are much less likely to get out of the way and after the incident have resources to cope. Language barriers affect behavior and information seeking.

Much more divergence was found in our studies and literature cited in the area of emotional trauma or injury following an event or an outbreak with some studies suggesting widespread panic and or flooding of emergency rooms as an outcome with other studies suggesting that such responses are not typical. Our findings suggested that people would be somewhat circumspect and rational in their responses and mainly seek help when they needed it. Women tend to be more prone after disasters to psychological problems and also tend to have higher risk perceptions to begin with.

Our studies confirm those in the disaster literature both in regards to pre-event and warning messages about biological conditions: messages must be simple, concrete, and consistent to be understood. Additionally messages must be timed right and must come from a credible source over multiple media channels to be understood. The

contribution of our study to this literature is the in-depth look at how specific words and images can confuse rather than enlighten the audience.

Our studies and those in the literature suggest that the media plays a larger and larger role in communicating risk and response to populations in disasters and emergencies. How stories are framed affects whether accurate information makes it to the population at large. News media have their own agenda and are not necessarily independent and neutral and are not necessarily public health allies. Facts are editorialized and public health messages are subject to the financial goals and aims of the media outlets.

There was also convergence between our studies and literature about how people use the media for outbreaks or emerging health threats. People use many different media outlets to learn about health. No matter what media that people turn to they seek confirmation from other media sources. This suggests a very real role that government and medical agencies should play both in corroborating or discounting news stories and supplying valid information both prior to and during an outbreak. However our studies also suggest that great care and effort needs to be put into messages about issue and conditions that people are not familiar with. Foodborne illnesses are not everyday occurrences and much more effort needs to be devoted to having valid pre- event messages in place.

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VII. APPENDICES

APPENDIX A: Some possible databases for electronic searching

1. Academic Search Premier {Ebsco}
2. All EBM Reviews {OVID}
3. Alt HealthWatch {Ebsco}
4. Article First {First Search}
5. Bioethicsline {OVID}
6. Biological Abstract {Ovid}
7. BioMed Central
8. Biosis
9. CINAHL {OVID}
10. Communication Abstracts (ECO) {First Search}
11. Communication & Mass Media Complete {Ebsco}
12. ECO {First Search}
13. Embase
14. Eric {Ebsco}
15. General Science Index
16. GPO {First Search}
17. Health Source: Consumer and Academic Editions {Ebsco}
18. HealthStar {OVID}
19. High Wire
20. Ingenta
21. JSTOR
22. LexisNexis
23. Lilacs
24. Masterfile Elite {Ebsco}
25. Medline {OVID}
26. Occ. Safety and Health
27. PAIS International {CAS}
28. PsychINFO {OVID}
29. Psychlit
30. PubMed
31. Science Direct
32. Sigle
33. Sociological Abstracts/Sociofile
34. Web of Science

APPENDIX B: Search Terms

Research Type

1. Survey
2. Opinion
3. Public opinion
4. Perception
5. Public perception
6. Focus group
7. Message
8. Review
9. Meta
10. Scope
11. Literature
12. Interview
13. Meta-analysis
14. Literature review
15. Verification
16. Analysis
17. Group
18. Verification analysis
19. Qualitative analysis
20. Qualitative

Communication

1. Disaster
2. Disaster warning
3. Disaster message
4. Emergency
5. Emergency warn
6. Emergency mess
7. Information need
8. Emergency response
9. EMS
10. Disaster Communication
11. Emergency communication
12. Risk communication
13. Crisis communication
14. Communication
15. Community information need
16. Response to government
17. Government response

Bioterrorism/Terrorism

1. Terror
2. Bioterror

APPENDIX B (con't)

3. Terrorism
4. Bioterrorism
5. Mass causality
6. Mass trauma
7. Emergency preparation
8. First response
9. Contamination
10. Biowar
11. Weapons of Mass Destruction
12. WMD

Agent Specific

1. Botulism
2. Foodborne illness