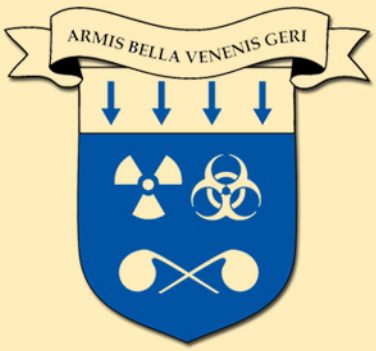
The "Worried Well" Response to CBRN Events: Analysis and Solutions

Lieutenant Colonel Fred P. Stone, USAF



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by

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The Author

Fred P. Stone is a clinical social worker whose most recent assignment was as the Commander, 43rd Medical Operations Squadron at Pope AFB, North Carolina. He served as the Chief, Medical Doctrine Development in the Office of the Air Force Surgeon General where he developed tactics, techniques, and procedures for responding to Weapons of Mass Destruction events and Homeland Security. Lt Col Stone also served as the Chief of Behavior Medicine at the Eglin AFB, Florida, Family Practice Residency. He holds a Ph.D. in Social Work and a Masters in Public Administration from the University of Utah. He also has a Master of Science in Social Work from the University of Texas at Arlington and Masters in Military Operational Art and Strategic Studies from Air University. Lt Col Stone started his career in 1983 as a C-130 Navigator and has more than 2,500 hours of flying time.

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Fred P. Stone

I. Introduction

> "Driven by fear alone, hordes of the 'worried well' could overwhelm emergency rooms and clinics, impeding diagnosis and treatment of the genuinely ill."[1]
>
> –U.S. Representative Chris Shays, Connecticut

Chemical, biological, radiological, or nuclear (CBRN) weapons in the hands of a terrorist or a rogue state is one of the greatest threats to the security of the United States.[2] These weapons of mass destruction (WMD) can cause catastrophic loss of life and innumerable injuries and challenge the U.S. health care system beyond its capacity to provide treatment. Most hospitals do not have the beds, equipment, staff, or facilities to adequately respond to a WMD event.[3,4]

Compounding this problem is that many people who have minimal or no exposure to a CBRN agent will seek medical care and slow down medical treatment of genuinely affected patients. These "worried well"[5] patients may comprise as many as 20 times the number of "legitimate" patients[6] and may become one of the most difficult aspects in dealing with WMD events.[7] This paper is an examination of the worried well phenomenon. It looks at three CBRN events that are often noted for unaffected masses seeking medical care—the Goiania Radiation Incident, the Aum Shinrikyo Attack, and the Anthrax Letters Incident.

The purpose of this paper is twofold. First, it provides a better understanding of the worried well response. Existing worried well literature often contains bold proclamations of the problem without a

substantial analysis, and researchers cite cases but fail to provide any in-depth study of them. This paper provides a closer examination of the cases and shows that the worried well response is neither irrational nor characterized by panic. Instead, when examined from informational, medical, and psychological perspectives, the worried well response is largely a rational reaction.

The second purpose of this paper is to provide a strategy to mitigate the worried well response in CBRN events. Admittedly, it is beyond the scope of this paper to provide a detailed worried well response plan for every possible CBRN event. This paper, however, does provide the basic elements to reduce the response and still provide proper health care for everyone affected by a CBRN event.

This paper is divided into three main sections. The first section looks at the worried well response in the three events. The next section examines some of the reasons for the worried well response. It looks at informational, medical, and psychological motivations of people who pursue unnecessary health care during a CBRN crisis. The final section outlines a plan to prevent or reduce the response. The paper concludes with a look at implications and suggestions for further research and action.

II. Case Studies

> "This incident sparked panic among the local population, resulting in more than 110,000 people demanding to be monitored for contamination. This large number of so called "worried well" demonstrates the widespread psychological and social effects that can grip a populace."[8]
>
> –Quoted from *Four Faces of Nuclear Terrorism*

The CBRN events examined in this section are three of the most commonly cited in discussions of the worried well response. These events were relatively small, resulting in less than 25 deaths, yet they each produced varying levels of fear, panic, and concern among the affected populations. They also produced significant economic costs. This section shows that worried well response can be diverse and the result of a number of factors.

The Goiania Incident

Goiania is a Brazilian metropolis with a population of 1.2 million. It is typical of many South American cities with large skyscrapers at the center surrounded by shanties and poverty in outlying areas. During the day, the city belongs to the pursuit of commerce, but at night, the trash pickers roam the streets looking for scraps that they might be able to sell or use. One such trash picker was Roberto Santos Alves who heard that a valuable piece of equipment had been left in an abandoned health clinic. On September 13, 1987, he along with a friend, Wagner Mota, decided to retrieve the equipment—a teletherapy machine. Unbeknownst to them, inside the machine was a thimble-size amount of Cesium 137, a radioactive isotope. When they cracked the lead and steel casing protecting the cesium, they unknowingly exposed themselves to deadly radiation and almost immediately felt sick.[9] Unfortunately, they did not connect their illness to the machine.

The device was sold to a junk dealer, Devair Alves Ferreira, who noticed a blue light emanating from the container. Fascinated by the

powdery substance and believing it was possibly valuable or had supernatural properties, he showed it to his family and friends and later, shared it among the community.[10]

On September 23, 1987, Mr. Ferreira's wife, Maria, became ill and went to a local hospital for care. She was diagnosed as having an allergic reaction to something she ate.[11] The next day another man reported to a different hospital and was diagnosed with "a symptom of some disease."[12]

By September 28, 1987, a significant number of people were ill. Mrs. Ferreira believed that the powder was the source of the illnesses and took it to a local physician. The physician did not examine the bag containing the cesium but was cautious enough to take it outside. Meanwhile, several more patients made their way to the Tropical Disease Hospital. They were misdiagnosed as having a tropical disease,[13] but one doctor suspected radiation poisoning and contacted a medical physicist.

On September 29, 1987, he confirmed that the sick villagers had been exposed to cesium and alerted national and local authorities. By evening, they were making plans to receive the contaminated patients at the Olympic Stadium. During the night, residents in the infected areas were evacuated. Authorities directed anyone who may have been exposed to the cesium to the stadium.

The next morning, residents woke up to find sections of the city cordoned off with no explanation. Rumors abounded and people went to the stadium seeking answers and possibly treatment. Eventually, 120,000 people or 10 percent of the population went to the stadium.[14] The government did not have the resources to meet the overwhelming response.[15]

Two hundred and forty-nine people were found to have been exposed to the cesium with 151 of those contaminated internally. If untreated, many of these victims would have developed cancer.[16] Twenty people required specialized inpatient treatment.[17] Ultimately, four victims died from exposure. Eighty-five residences were significantly contaminated and 41 were either totally or partially destroyed.[18] Residences as far away as 100 kilometers were found to be tainted.[19] The government found 12 tons of contaminated paper at the junkyard. Two buses and five cars required decontamination. Even money was contaminated leading to the screening of money at local banks. The government admitted that they would only be able to find 70 percent of the contamination.[20]

The official assurances by the government that they had confined the radiation assuaged few.[21] Protesters attacked the hearse carrying the body of two of the victims. They were concerned that the remains, although encased in lead coffins, would contaminate the area and destroy the value of the surrounding property.[22] The panic was not confined to the residents of contaminated homes. Others, including relatives, shunned the people of Goiania. Hotels expelled Goiania residents whose homes had been destroyed during the clean up.[23] Sales of Goiania goods fell an estimated 25 to 50 percent.[24,25]

Although the population reacted with fear, only 249 of 120,000 people were found to be contaminated. The rest were quickly labeled worried well. Ferguson and Potter found, "This incident sparked panic among the local population, resulting in more than 110,000 people demanding to be monitored for contamination."[26] Another author found that 5,000 of the first 60,000 people screened had only psychosomatic symptoms of radiation exposure.[27] They had not been in contaminated areas. An International Atomic Energy Agency (IAEA) report found, "Of the individuals monitored for radioactive contamination, 74% had spontaneously gone to be monitored for fear of radiation."[28]

The actual victims were surprisingly calm. One treating physician from Europe said, "They are very kind, very patient toward us, but they are also very lost. If they were Americans or Europeans, they would probably be panicked."[29]

The Aum Attack

The Aum Shinrikyo cult was founded by Chizuo Matsumoto, a sight-impaired yoga teacher who transformed his small yoga school and publishing house in 1984 into a cult with 40,000 members worldwide at the time of the attacks. Taking the title Shoko Asaharra or "Bright Light," he promised his followers salvation from the inevitable end of the world.[30] The group rejected Japanese society and waged an undeclared, asymmetrical war on its perceived enemies.[31] Prior to the subway attacks in 1995, the cult attempted 17 largely unsuccessful biological or chemical attacks.

The cult did successfully attack the town of Matsumoto on June 27, 1994. In an attempt to kill three judges who were expected to rule against

the cult in a land dispute, cult members sprayed the town for 20 minutes with sarin gas, a deadly nerve agent. Seven people lost their lives, 58 were admitted to hospitals, and 253 sought medical care in outpatient facilities.[32] Interestingly, 277 people did not seek medical assistance although they experienced symptoms.[33]

On March 20, 1995, Aum struck again, this time attacking pedestrians in the Tokyo subway system. Worried that the police would soon raid their compound, Asaharra ordered an attack on five subway lines that passed by the Kasumigaseki station which was located near police headquarters. The attackers hoped to catch as many police officers as possible during the morning rush hour. The Aum assault teams placed sarin liquid in plastic bags covered with newspaper.[34] As they left their trains, each attacker punctured the bag with an end-sharpened umbrella, spilling 159 ounces of sarin onto the five trains.[35] The liquid vaporized into a deadly gas. The attack began at 7:46 a.m. and concluded at 8:01 a.m.[36]

The first patients arrived on foot at St. Luke's International Hospital at 8:28 a.m. At 8:40 a.m., the first ambulances arrived and began transporting patients to area hospitals. Within one hour, St. Luke's received 500 patients. Not until 11:00 a.m. did local hospitals along with the rest of Tokyo learn that the victims had been exposed to sarin.[37] Many people who rode the subway that day went to their jobs unaware of the attack. They realized that they had been exposed after they saw news reports. Often only upon the urging of friends, family, and co-workers, did they seek medical assistance.[38]

The swell of patients overwhelmed the medical system. Ambulances transported 688 patients while 4,812 people reached hospitals on foot, in taxis or private cars. Two hundred and seventy-eight Tokyo hospitals and clinics saw 5,510 patients, 17 of whom were deemed critical injured, 37 severely ill, and 984 moderately ill.[39,40] One hundred and ten staff members at St. Luke's International Hospital, as well as the majority of emergency workers who transported patients, reported symptoms of exposure.[41] Surprisingly, only 10 percent of first responders who were unprotected experienced exposure symptoms. They only had mild symptoms and did not require treatment.[42] In the end, 98 hospitals admitted 1,046 patients.[43]

Among the flood of patients were the worried well. Smithson concluded that 85 percent of the patients were "psychogenic cases," or

worried well. She caustically concluded, "These psychogenic patients had no real chemical injuries, but they nonetheless clamored for medical attention."[44] Lillibridge, Liddle, Leffingwell and Sidell reported that 75 percent of patients who presented as "injured" showed no symptoms of exposure.[45] Benedek, Holloway, and Becker similarly charged that four times as many people who were unexposed reported to hospitals as those who had been exposed.[46] Stokes and Banderet concluded "73.9% of these casualties showed no effects of exposure to nerve agent. These patients were the worried well!"[47,48] Mathewson claimed, without a supporting reference, that 9,000 psychogenic patients presented themselves to local health care facilities.[49]

Anthrax Letters Incident

The weeks that followed the September 11, 2001, attacks were filled with anxiety and fear. The country was concerned not only of another strike using airliners but of CBRN attacks as well. Despite the heightened state of awareness, the next attack came almost unnoticed.

Between September 26 and October 2, 2001, eight people in the New York area sought medical care for an odd skin condition. At the same time in Florida, Bob Stevens,[50] 63, was admitted to a local hospital with "meningitis" and a co-worker was admitted to another hospital with "pneumonia." These seemingly routine medical cases would become the first bioterrorism crisis in U.S. history.[51] These people had been the victim of an anthrax attack.[52]

Mr. Steven's doctors began to suspect anthrax as the cause of his illness shortly after his admission on October 2, 2001, and two days later, the Centers for Disease Control and Prevention (CDC) confirmed their suspicion. Officials, however, maintained that it was unlikely to have been a terrorist attack.[53]

This assessment was proven wrong the next day. The health department found anthrax spores throughout the building where Mr. Stevens worked. Upon the direction of the health department, more than 1,000 who either worked at or visited the building were tested for anthrax and given a 10-day supply of antibiotics.[54] Only one person tested positive. She was already on antibiotics and never suffered from symptoms of the disease.[55] The source of the anthrax was thought to be a

letter. The CDC began educating postal workers nationwide on the signs and symptoms of anthrax exposure and how to properly handle mail to avoid exposure.[56]

More cases began to appear. Seven people in the New York City and New Jersey area were diagnosed with anthrax. All worked for news organizations that had received anthrax-laced letters.[57] While none would die, 2,580 people in New York City received nasal swabs and 1,306 were given antibiotics.[58]

On October 15, 2001, in Washington, D.C., a senate staffer opened a letter to Senator Tom Daschle that contained anthrax. The initial reaction in the office was "nonchalant" because they routinely received threatening letters,[59] but the mood changed quickly when initial checks showed the letter contained anthrax. Within days, the Capitol was shut down. The next week, Senator Daschle reported that 6,000 people had received nasal swabs and 28 had tested positive for anthrax.[60] Eventually, 10,000 people would take antibiotics.[61]

Since the anthrax was being delivered through the mail, the safety of postal workers was a primary concern. The letters were processed in primarily four processing centers—the Brentwood and Maryland postal facilities near Washington, D.C., and the Hamilton and West Trenton postal facilities in New Jersey. On October 18, 2001, one postal worker in each of the New Jersey facilities contracted subcutaneous anthrax. Those facilities were closed the next day. On the same day, a Washington D.C. postal employee who worked at both the Brentwood and the Maryland Centers was admitted to the hospital because doctors suspected inhalation anthrax. By October 21, 2001, three more postal workers in these centers tested positive for anthrax, and the centers were closed. A fourth D.C. postal worker was evaluated at a local hospital and discharged on the same day. He was readmitted the next day and died.

Two additional cases seemingly unrelated to the letters also developed. Kathy Nguyen, 61, died of inhalation anthrax. She worked in the stock room of the Manhattan Eye, Ear, and Throat Hospital. Hospital workers, patients, and visitors were offered testing and treatment, and more than 1,200 sought care.[62] None tested positive. The second case involved Ottilie Lundgren, 94, who died November 21, 2001. Her case was the most peculiar. Mrs. Lundgren lived alone and rarely left her house. Although officials were unable to find anthrax spores at her home,

some were found at a local mail processing center. Approximately 1,000 workers were given antibiotics as a precaution.[63]

In the end, 22 people developed anthrax and five died. More than 20,000 were considered at risk and advised to accept treatment.[64] Other sources place the number between 10,000 and 32,000.[65] Arguably, more than 99 percent of the patients that received treatment were worried well because they sought unnecessary medical care. This conclusion, however, is somewhat dubious because the overwhelming number of these patients did not seek help on their own but were advised to seek care.

Observers of the attack have differing views of the public response to the attacks. In his *Scientific American* article, "Evaluating the Threat," Ed Regis claims that the attacks caused a "wave of general hysteria with civilians buying up gas masks and Cipro [an antibiotic] like there was no tomorrow..."[66] Leonard Cole, author of the highly regarded book, *The Anthrax Letters: A Medical Detective Story*, characterized the nation as being in "turmoil" over the attacks.[67] On the other side, Vicki Freimuth of the CDC characterized the public reaction as "generally calm."[68] Surveys showed that Americans were concerned about anthrax but there was no widespread panic.[69,70] In an ABC News/Washington Post poll, 5 percent of people had spoken to their health care provider about anthrax and 2 percent had purchased antibiotics.[71] Only 3 percent had tried to get a prescription according to a Gallup poll.[72] Most Americans thought the story was "over-hyped" by the media.[73]

Health departments across the country were inundated with calls, overwhelming their capacity to respond.[74] From October 21 to October 27, 2001, nine states reported to the CDC that they received 2,817 bioterrorism-related calls.[75] One department received 25,000 general inquiry calls about anthrax during the two-week period of the crisis.[76] Across the nation an estimated 200,000 people called local health departments.[77] These inquiries are not "technically" worried well since they did not seek medical care,[78] but they do show a level of concern. Laboratories were also in demand. In Illinois there were no cases of anthrax or contaminated mail, yet the Department of Public Health processed 1,700 specimens.[79] Prescriptions for antibiotics increased significantly during the months of the attacks and were unwarranted given the threat.[80]

The fact that people called health departments does not necessarily

indicate mass panic. And while some people certainly obtained prescriptions for antibiotics, most were probably taking a precautionary step. Interestingly, at the same time the "real" anthrax letters were sent, 750 "hoax" letters purporting to contain anthrax were also found, and the public largely ignored this development.[81]

Emergency rooms near the areas where letters were processed had significant increases in patient loads. Providence Hospital near the Brentwood mail processing center saw as much as a 50 percent increase in the 2.5 weeks after the letters were discovered.[82] Three hundred and twenty-four patients sought anthrax testing at Washington Hospital Center during a 2-week period in October. Twenty were admitted but none tested positive for the disease. Local clinics also saw increases reporting 10 to 15 anthrax inquiries per day.[83]

While some who had little chance of being infected sought care, many others who were at significant risk failed to heed the advice of the CDC. The RAND Corporation found only 58 percent of the workers in the Hart Senate Building complied with the regimen of antibiotics.[84] Only 64 percent of employees complied with the regime at the Brentwood postal distribution center although two workers died there. [85] These numbers are higher than average but below what might be expected from a panicked population. Postal workers were also offered an anthrax vaccine but few took it, and some refused to take additional antibiotics although they were recommended.[86]

Anthrax victims were also remarkably unworried. Many had symptoms for several days before seeking care. Many symptomatic victims sought care and were misdiagnosed. A 61-year-old woman from New York had symptoms for three days prior to going in, and she ultimately died. The final victim had a fever, fatigue, dry cough, and shortness of breath for three days prior to going to the hospital. She also died. If these patient actions are indicative of the public response, there was no hysteria around the anthrax incident.

In the end, it is difficult to argue that the anthrax letters stirred masses of worried well. Although the cases involved four separate states and emergency rooms may have experienced modest increases in patient loads, the surge capacity of the health care system was not seriously tested.[87]

III. Understanding the Worried Well

This section proposes an explanation of worried well behavior based upon the case analyses in the previous section. This explanation looks at the problem from three perspectives—informational, medical, and psychological.

Information Explanations for the Worried Well

The most important factor in determining the worried well response is information. This section shows that government officials' statements and actions along with media reports largely drove the worried well response.

Government Directions

The government played a key although sometimes unwitting role in fostering the worried well response in all of the case studies. In Goiania, the government encouraged people to seek assessment and treatment. The population of Goiania was clearly fearful when they woke up on the morning of September 30, 1987, and found streets blocked off. Fear and depression spread throughout the community.[88] Screening was a way to reassure the public. People flocked to the stadium not primarily seeking medical care, but rather the reassurance that they were not contaminated. Considering the intense prejudice that people associated with the event suffered, seeking a "clean bill of health" was a logical thing to do. The screening was remarkably quick, requiring a technician to wave a radiation detector device, a dosimeter about the size of a hair dryer, around the patient.

Whether or not the government deliberately encouraged people to go to the stadium is debatable. Petterson argues that the government discouraged people from going but offers no examples.[89] Government actions, however, suggest they incited the reaction. Cordoning off sections of the city in the middle of the night and not giving information stirred the populations' fear. When faced with angry and hostile crowds, it is hard to believe that the people at the site did not actively encourage people to get screened.

In the anthrax letter case, federal, state, and local authorities encouraged anyone who had been in the buildings where contamination was found to get tested. Postal workers were also told to get tested and were given regimes of antibiotics. Absent this advice, it is difficult to estimate how many would have actually sought help.

In these incidents, it is impossible to accurately measure the number of people who would have sought care on their own because so many were urged to seek care by the government. From this perspective, federal, state, and local officials directly contributed to the size of the worried well response. This does not imply that they acted inappropriately, only that the governments and not the populations were largely responsible for the response.

Media Reports

The media was blamed for fueling the worried well response in each of the cases studied. In the Goiania incident, media reports were initially sensationalized and misinforming.[90] News stories compared Goiania with Chernobyl although the latter was considerably different and truly catastrophic. One headline read, "The contaminated areas will not be inhabitable for over 100 years."[91] The media coverage became more responsible as the event unfolded and became a useful tool in alleviating fear.[92] In the anthrax letter case, the media also made errors in reporting. "Most of the news we read about ourselves was wrong," said one worker.[93] The media was also blamed for providing inaccurate and misleading information in the Aum attack.[94] Their exaggeration of the dangers of the chemical attack directly fueled the worried well response.[95]

Blaming the media for the worried well response is misguided. While they certainly reported inaccurate information, in most cases they received the information from government officials. In Goiania, the government did not have a consistent spokesman. The media was often given conflicting information and left to decide on the "truth."[96] The information issued by the government was often contradictory and displayed a remarkable lack of technical expertise.[97] Consequently, although the local Goiania government tried to avoid panic by making public pronouncements, the citizens did not trust them and rumors spread.

Erroneous messages from government officials started immediately in the anthrax case. When Bob Stevens was diagnosed with inhalation

anthrax, health officials proclaimed that the cause was natural.[98] When questioned about the potential that it was a terrorist attack, officials maintained that it was unlikely. Health and Human Services (HHS) Secretary Tommy Thompson declared on October 4, 2001, that "there is no terrorism" involved in this anthrax event. Governor Jeb Bush reassured the public, "People don't have any reason to be concerned…this is just a coincidence."[99] In the end, the numerous mistaken messages eroded confidence in the government's ability to detect and respond to the event.[100]

While erroneous information was problematic, a lack of information fueled speculation in the press and public. The CDC was reluctant to confirm anthrax in the letters. They had routinely received calls that indicated anthrax as a possibility, and these reports, in the past, were always false. The last case of inhalation anthrax was in 1976 in a man who was working with wool.[101] The reluctance to discuss the case led to some anxiety. Congressional staff workers were frustrated with both the lack of communication and the quality of information.[102] "I was hearing 10 different stories," said one worker who finally decided to evacuate the building 45 minutes after the first messages went out.[103] Another staff member complained, "You hear from CDC, you hear from HHS, you hear from the Mayor's office; and the stories shift from day to day as to what the threat is."[104]

Even accurate information can lead to some concerns. When the best authorities in the world made statements about the anthrax letter case, some people feared that "something was really wrong."[105] In their reasoning, they believed that a lesser figure would have indicated there was a smaller problem.

The reason people sought unnecessary medical care is easy to see from an information perspective. They decided to get tested either because the government encouraged them to seek help or the information they read in the media encouraged them to seek care. In either instance, they were not acting irrationally or panicking. Instead they were making a rational health decision choice based upon the information provided to them.[106]

Medical Explanations for the Worried Well

Another perspective on the worried well is from a medical point of view. The inexactness of the data concerning the worried well in all of the

incidents makes this analysis difficult. One point, however, is clear. The worried well were not a homogenous group. This section proposes five subcategories of the worried well that lend some exactness to this issue. These categories are not necessarily discreet, and there may be some overlap.

Group 1. People who were exposed and had minor symptoms requiring minimal or no medical care.

Many of the worried well who flooded hospitals after the Aum attack had, in fact, been exposed to the gas. They were either in or near the subway when the attacks occurred, but were initially unaware of the attacks. Before realizing that they had been exposed, they exhibited symptoms including vomiting, eye irritation, and nausea. They went to the hospital only after being urged to go by others. The reception they received was not always welcoming.

The following case is typical of many that Haruki Murakami documented in his book, *Underground: The Tokyo Gas Attack and the Japanese Psyche.* Kei'ichi Ishikura was walking past the station when, unbeknownst to him, the attack occurred. He continued on to work but started vomiting and had problems seeing. He turned on the television and saw the report about the attacks. At the urging of his co-workers, he went to a nearby hospital. He told the doctor about the attacks, but the doctors said, "This is just a cold" and sent him away. He later received treatment, but he may have erroneously been counted among the worried well. More than a decade later, he continues to have eye problems and joint pain.[107]

The worried well in this category most likely received a low exposure to the toxin. They may have been worried, but they were not well. A 3-year follow-up of victims of the Aum attack showed people who were deemed to have low exposure (and were treated only as outpatients) had significant compromises to their nervous systems including a chronic decline in memory function.[108]

Group 2. People who may have been exposed but had no clear physical symptoms related to the event or an organic etiology.[109]

This group thought that they had been exposed and consequently sought health care. Their motivation may have been preventative, hoping

to avoid future problems by being treated immediately. They may have also been anxious and misinterpreted anxiety as symptoms of the disease.

The symptoms of sarin gas poisoning are numerous and have a lot of overlap with anxiety. The CDC lists the following as symptoms of sarin exposure:[110]

- Runny nose
- Watery eyes
- Small, pinpoint pupils
- Eye pain
- Blurred vision
- Drooling and excessive sweating
- Cough
- Chest tightness
- Rapid breathing
- Diarrhea
- Increased urination
- Confusion
- Drowsiness
- Weakness
- Headache
- Nausea, vomiting, and/or abdominal pain
- Slow or fast heart rate
- Low or high blood pressure

The Diagnostic and Statistical Manual of Mental Disorders IV (DSM IV) lists at least seven of these symptoms as part of a panic attack[111] and almost all of the symptoms with the exception of exhibiting pinpoint pupils could be the result of anxiety. These patients may also have misinterpreted pre-existing conditions, such as eye pain or nausea, as sarin poisoning.[112]

The anthrax incident highlights the same problem because symptoms mimic those of the flu. The symptoms of acute radiation exposure such as those in the Goiania incident are the same as numerous other health problems and include vomiting, diarrhea, and nausea.[113]

Confusing pre-existing or anxious symptoms for CBRN agent exposure should not be surprising. In most cases, it is difficult even for a trained medical professional to delineate whether a person has been exposed without tests.[114] Patients were misdiagnosed in each of the case studies.

Group 3. People who could not possibly have been exposed but came to the hospital seeking care for imagined illnesses or prevention.

People who have imagined illnesses based upon one symptom have a condition known as hypochondriasis.[115] It is estimated that between 4 to 9 percent of patients in a general medical practice have this disorder.[116]

There are no exact figures on the number of people suffering from hypochondriasis in the Aum attack, but it is very unlikely that they made up a significant portion of the worried well. However, patients with hypochondriasis and other somatoform disorders pose especially difficult problems during emergency situations. They can be demanding and difficult. They can also be real victims. In other words, people with hypochondriasis do sometimes get "sick." Therefore, even this group cannot be written off as having entirely psychological symptoms following a CBRN incident because they too may have been exposed.

Some of those who came to the stadium in the Goiania incident had been previously treated with psychiatric disorders.[117] Stress is known to exacerbate the symptoms of mental illness, and it is not surprising that they would seek help. There were also 5,000 who sought care at Goiania who could not possibly have been exposed yet they exhibited signs and symptoms of exposure such as vomiting, diarrhea, and rashes.[118]

Group 4. Those hoping to profit either financially or emotionally.

There was little potential for financial gain among the worried well in these cases. Although 4,000 people in the Aum attack have filed workers compensation claims, few have actually received payments.[119] Japan has a notoriously low litigation rate. During the 1990s, on average only 14 to

21 medical lawsuits were brought per year.[120] There are several workers contesting workers compensation in the anthrax letter case.[121] In the Goiania case, there were financial advantages in not being exposed.

Those exploiting the attacks for emotional gain could have also been among the worried well although it is doubtful they constituted significant numbers. Factitious disorder is a condition in which people deliberately make themselves sick in order to play the sick role. The prevalence of this condition is unknown but probably very low.[122] Disasters, however, represent the perfect opportunity to play the sick role.

Group 5. Those experiencing stress disorders.

Traumatic events can spur serious psychiatric illness. Acute Stress Disorder (ASD) is a mental disorder that includes flashbacks of the traumatic event, avoidance behaviors, and increased psychiatric arousal.[123] If the symptoms persist for more than 30 days, then the diagnosis is changed to Post Traumatic Stress Disorder (PTSD). PTSD can affect 3 to 58 percent of persons exposed to traumatic events.[124] ASD depends on the prevalence and duration of the stressor.[125] The psychological effects could be the greatest health threat in a WMD event.[126]

In the Aum case, the rate of Post Traumatic Stress Disorder varies depending on the study and time elapsed. A study conducted 6 months after the attack estimated that 26 percent of victims were at a high risk of developing PTSD.[127] A survey conducted by the National Police Agency of Japan found that 20 percent of victims suffered from PTSD 5 years after the attack.[128] One of the problems with this survey was that it was mailed to 1,477 victims and only 837 responded.

Noriko conducted an ongoing study for 5 years after the attack.[129] He found that less than 3 percent of victims met the full criteria PTSD. Seven to 9 percent of victims met some of the criteria. The rate increased to 14.1 percent when the researcher added physical symptoms to the diagnostic criteria. Overall, psychological symptoms did not decrease significantly during the 5 years following the attack.

It is difficult to compare psychological symptoms of the Japanese with American norms. The stigma of psychological problems is still considerable in Japan, and many "psychological patients" present with physical symptoms.[130] This may explain why approximately 10 percent of

patients in one survey have unexplainable physical symptoms such as headaches and fatigue.[131]

How many of the worried well in these cases had stress disorders? Again, this is unknown, but intense anxiety will not cause immediate serious injury or death by itself. In other words, no one suffering from a stress disorder was going to die from their anxiety (with the exception of suicidal patients or those with an underlying health condition exacerbated by stress).

One argument supporting these patients seeking immediate health care is that early intervention could reduce the incidence of PTSD. While early intervention has been shown to reduce the rate, studies typically consider early intervention to be within 1 to 3 months.[132] Patients who showed up at health care clinics with PTSD or other acute stress symptoms did not need immediate medical care.

Psychological Explanations for the Worried Well

This section explores psychological reasons minimally or unaffected people may seek health care during a disaster. It excludes those who are clearly mentally ill.

Survival psychology is the study of how people respond to catastrophic events such as terrorist attacks or natural disasters. In his review of the psychological impact of catastrophic events, John Leach found that these events have a complex underlying dynamic, but people generally respond in a predictable manner.[133] Contrary to popular opinion, people do not panic except in enclosed areas where escape routes are not readily available.[134] Even then, they may not panic. The 1993 World Trade bombing was characterized by a surprising amount of calm and cooperation in the stairwells.[135] Overall, the victims in the Aum attack did not appear to panic. One victim recounted, "We were told to leave the station by the rear exit, there being some kind of disturbance toward the front of the train. Everyone was well behaved and slowly walked back toward the exit."[136]

Leach also found that victims are often characterized by apathy and denial about catastrophic events.[137] In the Aum incident, some people apparently did experience denial because they did not immediately rush to the hospital. If it had not been for the barrage of media reports and the urgings of others, some may have never sought help. Some have argued

that a remarkable part of the anthrax letter incident is the overall calm of the general population.

The population overall shows a remarkable degree of denial and apathy towards possible CBRN incidents. A recent survey found that Americans in general would resist government instructions during a smallpox outbreak or dirty bomb incident. Only two-fifths would take the vaccine and only three-fifths would take shelter for as long as the government recommended in a dirty bomb incident.[138,139]

Despite these findings and although people may not panic, many will most likely seek health care unnecessarily. The key to understanding this phenomenon may be appreciating the role of uncertainty in human behavior. Health is an unpredictable, complex, and ambiguous situation that often leads to uncertainty.[140] Exposed to health hazards, people must appraise their situation, properly self-diagnose and treat themselves.[141] In the absence of reasonable certainty, people will seek expert advice. The victims in all of the incidents examined in this paper were uncertain. In the Aum attack, the Japanese had no public affairs strategy for a chemical attack, so people flocked to hospitals to be reassured. In Goiania and the anthrax letter incidents, people were dying, and it was impossible to ascertain exposure without screening.

The very nature of these events will always leave a great deal of uncertainty.[142] Adding to this uncertainty is that these types of events often unfold over long periods of time.[143] The crisis of the worried well is fostered and fed because of the delay in accurately identifying the problem and communicating it to the public.

Similar to the uncertainty perspective is a risk analysis model. People may make risk assessments of their situation. Fear increases when people are involuntarily exposed to a stimulus that is unfamiliar and invisible.[144] It is further increased when the threat is poorly understood, and it is difficult to predict its course.[145] CBRN incidents contain all of these factors. Considering that physicians in all of the cases in this study showed significant gaps in their knowledge of the threats, it is unfair to expect the public not to express fear and concern—and seek medical advice.

Looking for Answers

The above analysis shows that any program to reduce the worried well response must take into account several factors. The program must:

1. Provide accurate and timely information to the public.
2. Respect the variety of reasons that unaffected people may seek care.
3. Accurately separate and distinguish worried well patients from seriously injured patients in a timely manner.
4. Provide an appropriate level of health care for all victims of a CBRN event.

The next section outlines a program that incorporates these key elements.

IV. Responding to the Low Risk Patient Response

This section proposes a series of steps that will both reduce the number of worried well patients and as necessary, prevent them from using unnecessary health care resources. Any plan to prevent a worried well surge is predicated on the size of the event, the nature of the threat, and the availability of health care facilities. It is beyond the scope of this paper to outline a plan for every possible scenario. Therefore, this section proposes only a very general plan for reducing the worried well response in a CBRN event.

Re-Thinking the Worried Well

The first step in developing a worried well response plan is to rethink the phenomena. Most analysts take a very negative view of the worried well, labeling them as irrational and unreasonably demanding of health care.[146] Yet the cases analyzed in this study provide a very different picture. Most of the so-called worried well acted with surprising rationality. For example in the Aum attack, many victims had significant changes in their vision. St. Luke's International Hospital discharged 524 patients to their homes who were experiencing eye irritation. Going to a health care facility with these symptoms is the right course of action since a threat to sight is one of the conditions that warrants immediate medical care.

In Goiania, many people were unable to conduct business without a certificate stating that they were free from radiation so they went to the stadium. In the letter incident, the government provided free testing for those potentially exposed to anthrax, so thousands were tested. The post office did not know how many letters with anthrax were floating around the country. Tens of thousands may have had low levels of contamination.[147] When people who were only peripherally associated with the mail died, such as the woman in Connecticut, it seems rational that people would call health departments with questions especially when government officials warn them to be vigilant. The worried well in all of these cases largely exhibited perfectly logical behavior considering the circumstances and ambiguous information they were receiving from the television and government. It is not only unfair but also counterproductive

to judge their behavior as abnormal. The worried well response must be viewed differently in order to provide an effective solution.

The first step to changing this view is to replace the term "worried well" along with similar terms such as "mass hysteria" and "mass psychogenic illness" with a more exacting term that is less pejorative. Alexander and Klein recommend the term "multiple unexplained symptoms."[148] This term is less insulting, but it is still inexact.

A more precise system might consider using the following groupings:

Group 1. Minimal Exposure

Group 2. Asymptomatic Exposure

Group 3. Hypochondriacal

Group 4. Malingering

Group 5. Stress Disorder

This system has the disadvantage of making a determination concerning the psychology or motivation of patients. However, this is also an advantage. If the patients' presenting problems can be determined to be entirely psychological, fewer resources will have to be used on them. In a crisis, every resource will be critical, and the seriously injured will need priority treatment.

Hall, Norwood, Fullerton, Gifford, and Ursano recommend a categorizing system that labels patients as high, moderate, or minimal risk.[149] The advantage of this system is that it "conveys concern and promises continued monitoring."[150] The only problem with this system is that it may later be confused with medical triage that uses minimal, immediate, urgent, and expectant categories. Further complicating the problem, different treatment actions would also be necessary depending on the risk level, and these have not been developed.

A simple term that is non-pejorative and accurate is to label worried well patients as "low risk patients." This label acknowledges that these patients may have been exposed but do not need immediate treatment. Depending on the incident, accessing exposure risk is relatively easy. Medical workers need only a brief history to determine where a patient was in relation to the incident. The workers could also obtain vital signs such as blood pressure, temperature, and oxygen saturation levels and rule

out an imminent threat to the patient's life. Some detection devices can also rapidly determine whether or not a person is at a significant health risk from a CBRN agent.

No labeling system is perfect, but the term "worried well" is clearly inappropriate and unhelpful during a crisis. The remainder of this paper uses the term "low risk patient" (LRP) instead and proposes an LRP Response Plan to minimize the impact of these patients on medical consequence management in CBRN events.

Pre-CBRN Event Preparation

Planning to mitigate the low risk patient response must begin well before the actual event, and it starts with preparing the public. There are several steps that can promote pre-CBRN event preparation.

Community Involvement

First, communities must be involved in terrorist response measures. They should engage in drills and exercises similar to those conducted in the 1950s and 1960s for responding to a nuclear attack. Those efforts placed more responsibility on the citizenry and fostered greater community involvement.[151] These same steps could prepare communities to respond to a CBRN event. While this program has potential problems such as inciting unreasonable concerns, the population will be better prepared to respond and more understanding that their government cannot solve all the problems. It may relieve the government of some of the burden of protecting the citizenry while "giving people a tangible role to play in the defense of their country."[152]

Partner with the Media

Information is the most important contributor to the low risk patient response, and both the media and government officials play a critical role in informing the public. Unfortunately, government leaders and the media often have a contentious relationship. In each of the three events examined, government officials castigated the media for misreporting the event and causing the panicky reactions of the public. The media equally

criticized government officials for failing to provide accurate and timely information. To mitigate the low risk patient response, government officials and the media must partner together.

The LRP Response Plan proposes that federal, state, and local leaders need to routinely engage the media prior to a crisis to develop partnerships. CBRN-event response plans should have a formal structure for public health officials and the media to work together to disseminate information to the public, field workers, and health care professionals.[153] This structure, however, should not merely be public affairs officials providing press releases. The media must be treated as genuine allies in CBRN event response.[154] They should not only cover exercises but be a part of them. They should be invited to participate in conferences and to present their views to responders.[155]

Develop Trusted Agents

In addition to partnering with the media, the government must have people who are qualified to speak to the public on CBRN issues and are trusted by the public. In other words, the government needs to develop and promote "trusted agents" to disseminate information before, during, and after a CBRN event. An obstacle in finding trusted agents is that someone that the public inherently trusts is not necessarily someone who has expertise in the CBRN area. Therefore, trusted agents need to consist of "trusted communicators" and "validators."[156]

Trusted communicators are people that the public knows, respects, and believes.[157] They may be nationally-known politicians, media figures, or entertainers. For example, Colin Powell would be an excellent trust communicator. A Pew Research Center study found that Colin Powell was the most credible politician in America.[158] The same study found that Oprah Winfrey was also a trusted source. Somewhat surprisingly, network television anchors ranked very high in trust and credibility, well above politicians. Other celebrities rated "trustworthy" include Tom Hanks, Ron Howard, Morgan Freeman, Denzel Washington, and James Earl Jones.[159] These popular figures are trained in communicating messages to the public and can attract public attention.

In addition to these national figures, local trusted communicators can also be invaluable in a CBRN event.[160] These may be political, civic,

business, or religious figures that are known in the community and have developed trust among significant portions of the population. Local "sports heroes" can also serve as trusted communicators.

While trusted communicators can attract public attention and win public confidence, they would typically not be subject matter experts. Therefore, trusted agents must include validators who are experts on CBRN events. These validators should be scientists or physicians who can provide the most scientifically accurate information on the threat as well as the safest courses of action. These experts will need to be viewed as apolitical and must be media savvy. They will need extensive training to be able to put their recommendations in plain language for the public to make the right choices. In past events, experts often mistakenly left the translation of scientific information to the media.[161]

Together, trusted communicators and validators would speak to the public during a time of crisis. The trusted communicators could gain public attention and confidence while the validator could provide essential expert information. Devising a plan to utilize these teams could be accomplished almost immediately by soliciting trusted communicators and providing them with basic training on their role in a CBRN event. Validators should also be recruited, given media training, and could begin interacting with the public and the media in advance of an actual event.

While developing trusted sources is challenging, it will be essential to effectively communicate with the public and to maintain the credibility of the government and crisis responders. Maintaining credibility may be the most difficult aspect of the government response to a crisis, especially as it unfolds over many weeks and months.[162,163]

Prepare alternate communication channels

Government officials must develop a communication plan to the public that uses all avenues of communication. Besides radio and television, they should also have a hotline and website readily available. The website should contain information on how to prepare for a CBRN event and once an event happens, provide up-to-date information and instructions. The site might provide a question-and-answer forum. A hotline can also provide information on the latest developments.[164]

All of these steps should begin immediately. Planning for the LRP

response is as important as any other consideration in a CBRN event and must be done as part of the planning process. The next section discusses the actions that can be taken once the event has occurred.

Post-CBRN Event: Preventing LRPs from Seeking Immediate Care

The primary goal of the LRP Response Plan is to keep people who do not need urgent or immediate care away from health care facilities. Low risk patients must be encouraged to stay home or to go to an alternate facility for assistance during periods of high demand at health care facilities following a CBRN event. To accomplish this task, government officials should institute a three tier pre-triage process (Figure 1).

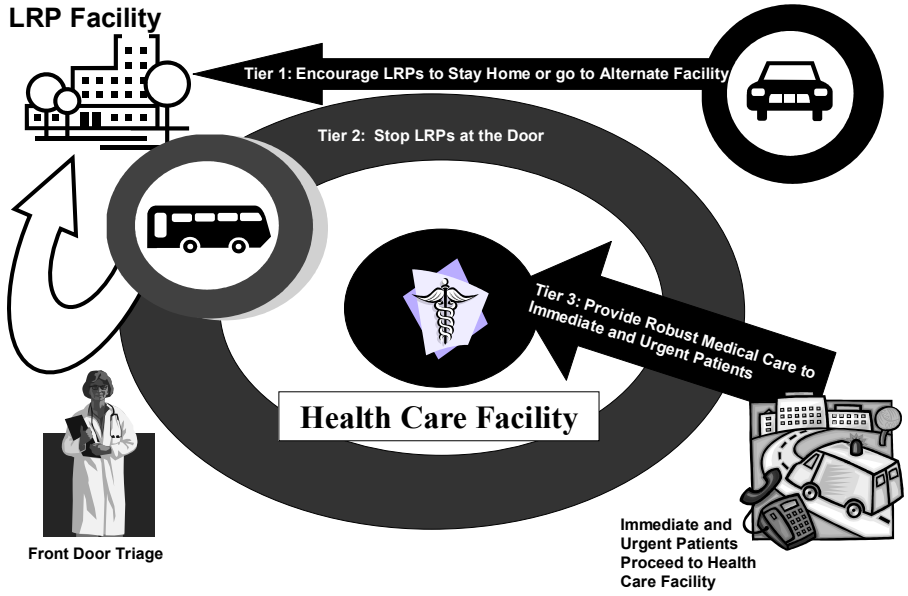

Figure 1. Low Risk Patient Response Plan

Tier 1: Prevent LRPs from Seeking Care

The first tier of the pre-triage process focuses on two tasks. The government must provide clear and effective messages to the public, and it must provide an alternate facility for LRPs as necessary.

Effective Communication. Immediately after a CBRN event, government officials must be ready to provide the public with information. They must provide clear directions in an effective manner in order to reduce the low risk patient response. Effectively communicating with the public during a CBRN event will be challenging. These events require leaders to make irreversible decisions within a narrow timeframe. The intentional nature of WMD attacks "renders information more imperfect or incomplete than in other crises and outcomes of decisions markedly uncertain."[165] In other words, officials will need to communicate imperfect knowledge immediately. Several actions may facilitate more effective communication.

Prepackaged or prepared messages can speed up message delivery and provide accurate information, although it is not a complete solution to the problem. The CDC has prepackaged extended and short messages concerning CBRN events that can provide immediate information to the public and can be tailored for the situation.

Here is an excerpt from part of a CDC message concerning anthrax:

- This is an urgent health message from the U.S. Department of Health and Human Services (HHS).
- Public health officials believe that the spores that cause anthrax may have been deliberately released in the *xxx area*.
- At this time, we do not know the extent or source of the anthrax release. Local, state, and federal officials, including HHS, FBI, and Homeland Security, are working together. Updated announcements will be made as soon as these officials know more.
- Anthrax is a disease that affects both humans and animals. In people, it can be caused by spores that are released as a powder or into the air. The spores are not known to spread from person to person.
- Based on what we know now, only those people who were in *xxx area* on *xxx date* are at risk for getting sick.[166]

These messages do not directly address the low risk patient response issue although the information they provide can reduce the problem. Adding a line such as, "If you were not in the affected areas or if you do not have XXXX symptoms, do not seek health care at this time," will also reduce the LRP response.

Another problem with communicating during a CBRN event is that government officials will also be competing among a host of "voices." These voices will include federal, state, and local authorities as well as commercial and media interests with potentially different perspectives on the crisis.

Politicians will want to weigh in on the conversation, and their statements will likely be slanted in a political direction.[167] During the anthrax attacks, many of the victims believed that the statements made by government officials were "spun" for political advantage.

Another voice may come from commercial interests. Some accused the manufacturers of Ciprofloxacin, a drug used to treat anthrax exposure, of "stroking the frenzy and playing into public hysteria by promoting their drug."[168] Manufacturers of safety equipment may have a vested interest in promoting their products as well. Under the umbrella of promoting public safety, these manufacturers and retail dealers could make enormous profits.

There will be a plethora of "experts" flooding the airways with advice and analysis. The communication environment is further complicated because "experts" often do not agree on the proper course of action.[169]

Finally, family and friends as well as other social networks will have a significant impact on the decisions that victims make. In the Aum attack, it was often co-workers and family members that persuaded people to go to the hospital. Even with the best intentions, these voices may offer competing advice and analysis.

To compete among these voices, government officials must manage their messages carefully. Their messages must be devoid of political motivation. Politicians who attempt to "spin control" public information only thwart meaningful communication and undermine public trust.[170] The information should be honest and include statements that accurately convey the known risk at the time. Ironically, governments often fear causing panic and avoid giving useful information that might reduce the appearance of LRPs.[171] During a crisis, the risk adverse approach can be as devastating as a reckless information approach.[172] Having trusted agents to deliver these messages will also greatly aid in its effectiveness.

Create an alternate site for LRPs. Regardless of governmental reassurances, some LRPs will still seek immediate care. Therefore, the government should instruct those that are still concerned or unable to determine whether or not they are low or high risk to proceed to a pre-designated LRP facility.

Directing low risk patients to go to a local community center or school is a better alternative than having people go to hospitals or clinics and hampering emergency care. These areas would be primarily observation areas that conduct ongoing assessments and provide psychological comfort. Depending upon the size of the event, the LRPs may be promised that they will eventually be seen at the health care facility. However, most will be expected to go home after they have been reassured that they do not need immediate help.

There are some advantages to seeing low risk patients beyond the decrease in health care demand.[173] First, if symptoms develop hours after the attack, medical care will be more readily available. Second, there may be psychological benefits to early intervention.[174] Of course, if there is a significant contagious threat from a biological hazard, then an alternate site may be ill-advised. Instead, planners must consider quarantine measures.

An important question is "who will staff these alternate facilities?" The LRP facility will have to be run by a professional who has been trained to deal with this problem. A physician, physician assistant, or nurse practitioner will also need to be available to provide more robust medical evaluations. Volunteers can be a valuable resource. The Red Cross can be vital in manning the alternate site and can provide some mental health support.[175]

Mental health professionals can also be a valuable resource. The problem of the LRP response is not primarily a mental health problem, and planners should not count on mental health professionals such as psychologists, counselors, and social workers to solve the problem. These professionals, however, can provide important services at the LRP facility. Most notably, they can provide psychological first aid.

Psychological first aid helps the victims of traumatic events cope in the immediate aftermath of a disaster or catastrophic event. This approach is evidence based, flexible, and culturally sensitive.[176] It can provide essential care for people who have acute signs of distress such as disorientation, panic, excessive worry, and confusion.[177] Psychological

first aid is not specifically designed for the LRP response but will aid in helping ease the anxiety of those that come to the LRP facility. The essential steps of psychological first aid include:[178]

1. Responding to patients in a compassionate manner.
2. Providing physical and emotional comfort.
3. Calming and reorienting patients.
4. Identifying the needs and concerns of patients.
5. Providing practical assistance if possible.
6. Assisting with connecting with social support networks.
7. Providing coping information.
8. Linking to other services.

Mental health providers along with other health professionals can also take vital signs and histories in order to assist with triage. Admittedly, this step would be controversial, but in a crisis, where health care professionals are potentially in short supply,[179] any reservations about the para-professionals making these assessments must be matched with the realism that this effort demands.

Military members in health care specialties other than primary care and emergency physicians and nurses can be a valuable asset during these events.[180] First, some physicians such as dermatologists and other health care professionals such as dentists have enough primary care training to properly assess patients and can conduct some life saving care. The military medical community also has a cadre of health care workers who are already trained in basic life support and patient assessment. These personnel conduct regular exercises in disaster response and can be invaluable in a CBRN event, both at the health care facility and the low risk patient facility.

Tier 2: Stop LRPs at the Door

Some low risk patients will inevitably proceed to the hospital and clinic despite the encouragement to go the LRP facility. All patients must be immediately met and triaged, and low risk patients must be directed to

the LRP facility. If they are unable to transport themselves, the health care facility should have transportation such as buses or other vehicles available. Ambulances should not be used as they will be needed for seriously injured patients, and transporting LRPs in ambulances only reinforces their belief that they have a more serious condition. Transportation will inevitably be delayed and a cordoned waiting area for LRPs, away from the main entrances, should be included in planning.

A problem posed by this action is that a health care provider will have to make an almost immediate decision about the status of a patient. While this appears to be a daunting task, it is actually relatively easy if the government is willing to accept a modicum of risk. A patient's vital signs can be taken along with a short history. Determining whether or not a patient is in immediate need of medical attention is typically obvious even to untrained observers. Health care workers can administer standard medical assessment tests to see if patients have been exposed to a biological agent. Biological agents can often be defeated if they are detected early. In the case of a radiological incident, the workers could also screen masses of people with a dosimeter. Early detection tests are not as accurate as other tests that take longer to process; however, they can be an effective screening tool in a crisis.

A significant CBRN event will require triage. Triage is the systematic method in which patients' injuries are matched against the available health care. In this system, patients are typically categorized into minimal, delayed, immediate, and expectant. Minimal patients have minor injuries, and delayed patients have injuries that can wait to be treated. Immediate patients need attention as soon as possible while expectant patients are expected to die because of their injuries. Extensive health care may be able to save the life of an expectant patient, but the time and resources required may deprive many more immediate patients of life saving care.

Triage has not been done in this country on a large basis since 1865 during the American Civil War, and the civilian population may not be prepared for the hard decisions that will have to be made. Health care providers must sort casualties based upon severity of injury or illness and match them with available resources.[181] Triage separates patients who urgently need help and will likely recover with immediate care from those who do not need care or are unlikely to recover. Considering the uniqueness of CBRN attacks, medical providers need clear triage

guidance. In anticipation of such scenarios, many hospitals and health care organizations are already adopting robust triage protocols.[182]

Inevitably, some high risk patients will be misdiagnosed as low risk patients. At the LRP facility, para-professionals may be asked to conduct elementary triage, and the chance of errors may be greater than with a physician or nurse. Even fully qualified heath care professionals, however, are also susceptible to making mistakes, as a number of misdiagnoses occurred in each of the case studies covered. The size and scope of the CBRN event may require accepting these risks in order to serve the most people.

Tier 3: Comprehensive Medical Care

Those requiring robust and immediate health care would proceed to Tier 3 to receive comprehensive medical attention. It is important to recognize that all tiers provide medical care in that taking vital signs and providing reassurance is also an important part of medicine. Tier 3 patient care, however, would be distinguished in that it would provide more complete care for those who require it and will be unencumbered by droves of low risk patients. This care would include drug administration, wound care, and hospitalization as needed.

Other Considerations: Security and Liability Coverage

Two other important issues will need to be addressed in an LRP response plan. First, depending on the CBRN event, some LRPs may become violent if they cannot receive immediate robust care. Although there was no indication of people resorting to violence in the case studies mentioned, there is no guarantee of peaceful compliance in future incidents. By definition, triage allocates resources, and in a mass casualty event, some patients may violently demand immediate medical attention. Therefore, robust security both at emergency rooms and the LRP facility will be essential. The country may need to be prepared to use a significant number of law enforcement and National Guard assets to safeguard health care facilities as well as medical stockpiles, especially in the case of sudden outbreak of a serious biological threat or what is perceived as such.

Another potential problem is the legal ramifications for health care

providers. Health care providers regularly practice defensive medicine by ordering nonessential tests just to be sure of their diagnosis and in order to avoid being sued later. A CBRN event may require difficult choices and quick decisions. Health care workers (including volunteers at the LRP facility) should be free from liability, if an emergency is declared, when providing care during a CBRN event. This step may eliminate the small number of LRPs hoping to profit from the event.

LRP Response Plan Summary

A plan to mitigate the threat from a surge of LRPs in a CBRN event requires extensive preparations and tough decisions. The LRP Response Plan proposed in this section meets these demands and addresses the concerns found in the LRP responses in the three case studies.

First, it provides important and reasonably accurate information from a trusted source to the public. It respects the legitimate motivations of LRPs and provides a method for them to both self identify as LRPs and to be appropriately triaged. It also provides some monitoring in an effort to reduce the level of uncertainty many of them will have, while at the same time reducing the number of LRPs at actual health care facilities. Finally, it allows medical providers to provide robust care for seriously injured patients while reassuring LRPs that they have not been ignored or dismissed.

V. Conclusions

The Low Risk Patient (LRP) response poses a serious threat to the ability of health care facilities to adequately respond to victims of a CBRN event. As this study showed, our understanding of the LRP response is woefully inadequate and often based on misconceptions of the problem. LRPs are not hysterical masses inappropriately seeking attention, but rational people seeking accurate information and proper care.

In order to properly prepare and respond to an LRP surge, planners must use appropriate information and medical resources. This paper proposes that setting up a system to provide information will significantly mitigate the problem. It further proposes that by providing limited monitoring at an alternate facility many more LRPs can be kept from seeking aid at health care facilities. This plan, however, is only a beginning.

Further research into the LRP response is still needed. This study only examines three incidents and largely looks at secondary sources for its conclusions. The literature review for this study failed to find a single, scientifically valid study of the LRP response. The motivations of LRPs need to be more closely examined and predictive models need to be developed.

The federal government should establish a center of excellence for understanding the psychological, emotional, and physical consequences of CBRN events. The center should partner with efforts that are currently being done in several educational institutions.

Government leaders should also pass the *National Resiliency Development Act* which mandates a "task force for the purpose of increasing the psychological resilience and mitigating distress reactions and maladaptive behaviors of the American public in preparation for and in response to a conventional, biological, chemical, or radiological attack on the United States."[183] This legislation should also help to develop accurate ways to measure the distress and coping of a community during the actual event. Unfortunately, the bill has not yet been able to get out of committee.

One significant way to increase our knowledge of this important issue is to study the reactions of people involved in CBRN events. Although

CBRN attacks or accidents are rare, incidents do happen. For example, in October 2006, a fire at a chemical plant in Apex, North Carolina, forced the evacuation of thousands of local residents. Some of these residents could be interviewed to measure their reactions and their evaluation of the effectiveness of local response. Conducting a qualitative research project with these residents could provide invaluable insights into this problem.

Some actions should be taken immediately. LRP response plans should be part of every CBRN response plan. Communities should also conduct regular large scale exercises that involve not only health care facilities and local responders but also public leaders and the media. Exercises such as "Dark Winter," conducted in 2001, that looked at the U.S. response to a smallpox outbreak are excellent opportunities to understand the impact of a CBRN event. Similar exercises with local responders and the media should be conducted as well. These exercises offer the opportunity not only to run plans but build important relationships between all responders, not just law enforcement and health care. They should also become "media events" in order to raise the awareness of the CBRN threat and educate the public on response procedures.

Communities should also be more involved in terrorist response preparations on an ongoing basis. Communities should engage in drills and exercises that involve a significant number of people beyond official responders.

Community vulnerability assessments looking at resiliency should also be conduced before and during a natural disaster or terrorist event.[184] This would enable leaders and health care professionals to promote resiliency tailored for a community.[185] The Institute of Medicine recommends that preparations for bioterrorism response include an assessment of the psychological impact of an event on a community.[186]

LRPs flooding into health care facilities during a CBRN event threaten the ability to provide proper health care. But by making some preparations today, communities and local health care facilities can largely mitigate this problem. With further research, better techniques will also help. Efforts to build community resilience will also reduce the LRP response and greatly aid in preparing communities for a CBRN crisis.

APPENDIX A:

Problems Estimating the Worried Well Response

The psychological reactions of the direct victims of CBRN have rarely been properly studied.[187,188] Despite confident claims that the worried well are a significant problem, the review of the literature for this study failed to find a single, scientifically-valid study of this phenomena. These case studies highlight two problems in accurately accounting for the worried well.

The first problem is that the number of victims is questionable. For example in the Aum attack, it is unclear who was counted among the victims. St. Luke's Hospital saw 641 patients the day of the attack but another 1,400 came to the hospital in the week that followed.[189] One hundred and sixty-nine hospitals reported seeing sarin victims in the days and weeks after the attack.[190] It is unclear whether or not these numbers were included in the worried well estimation. On the other hand, some victims may have been exposed and never come to the hospital as in the case of the Matsumoto attack.[191] And some may have needed medical care and were sent home.

Mitsuteru Izutsu was a passenger on the Tokyo subway the morning of the attack but did not realize what had occurred until after he arrived at work. He thought there was a problem with the lighting in his office because everything was dark. His friends and co-workers encouraged him to go to the hospital. He was placed on an IV drip but given no other tests. After an hour and a half, a hospital staff member announced to those in the waiting room, "Would those who feel all right now please go home and come back tomorrow."[192] This self diagnosis and triage may be one way to clear the waiting room of patients, but it does not assure that the patients who leave are in fact well. Mr. Izutsu continued seeking eye treatments for 10 days after the incident.[193]

Naoyuki Ogata provides another interesting story. He had some eye problems and was given intravenous fluids. The doctor asked him whether or not he was going to go home or stay in the hospital. Mr. Ogata decided to go home. Several days later he was diagnosed as having kidney failure and admitted to the hospital.[194] It is unclear in the official

accounts whether patients such as Mr. Ogata were counted as worried well because they were sent home quickly, or as a "legitimate victim," or both.

The problem is equally troubling in the Goiania incident. Researchers are clearly estimating the number of patients when they report rounded numbers such as 60,000 and 110,000. It appears there was no clear record-keeping of who actually sought care. In addition, the Goiania event was very stigmatizing in the region. People, including relatives, refused to have contact with those from the city. To combat this problem, the government issued a certificate that "proved" a person was free of radiation.[195] It is very likely that some people came to the stadium not because they primarily feared exposure, but wanted to prove to others that they were not affected. Eight thousand received certificates.[196]

In the anthrax incident, victims had a choice of whether or not to seek their own medical care, and this has not been documented. On Capital Hill, some staffers initially wanted to go to their private doctor or to the hospital. The Capitol Hill medical team physician reportedly told them that this was unnecessary. They would simply need testing and antibiotics.[197] Unfortunately, we may never know how many of these people, as well as other victims, sought private care. The *Washington Post* reported that local hospitals and clinics had significant increases in patient loads during the anthrax incident.[198] Unfortunately, these reports are largely anecdotal and not closely studied.

Another problem with estimating the number of worried well is that the term is not well-defined.[199] Some researchers of the Aum attack appear to label all patients who received outpatient treatment only as worried well, and only 19 percent of victims were hospitalized.[200] This standard, however, is too high if we are going to argue that the worried well should have stayed away from health care centers. Many patients were exposed, and only trained medical staff could competently decide whether or not their symptoms warranted hospitalization. It is suspect that some researchers based their estimates on chart reviews. The problem with this retrospective methodology is that it fails to consider the perspective of the patient. A trained medical provider may easily be able to look back in hindsight and determine that urgent medical care was not needed. At the time, however, this same provider may have urged a patient to seek care to determine their level of need. In the anthrax letter and Goiania incident, most people merely sought testing and not medical

care. Considering that the governments in each case encouraged people to get tested, it is unfair to lump them into the worried well category with those who sought care on their own.

APPENDIX B:

The Critical Role of the Department of Defense

The Department of Defense (DoD) will have a critical role to play in responding to a CBRN event. While they are not likely to be the first responders in a catastrophic event, the DoD has significant numbers of personnel and equipment along with the ability to move these assets quickly.[201] Already, military units are part of the Federal Response Plan. The military can play a vital role in disaster relief by providing medical care. They can also be vital in supporting the LRP response.

While military primary care and emergency physicians and nurses can provide robust medical care at Tier 3, other health professionals can assist at the LRP facility. For example, the military has a plethora of mental health professionals such as psychologists and social workers that can be used to respond in a crisis. These professionals could man the LRP facility and provide psychological first aid. Although they are not currently credentialed to take vital signs and perform preliminary triage, training them to perform this task would benefit not only their disaster response capability but make them a more valuable asset in a combat zone. The military also has psychiatrists and psychiatric nurses who are already qualified to perform basic medical evaluations.[202]

The military health professionals are also experts in patient administration and tracking. They can be vital in providing much needed assistance both at the low risk patient facility and the main health care center. The military security forces can also provide security at both locations.[203] The DoD could also fund and organize some mass exercises to prepare health care workers.

Notes

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98. McIntyre and Venette, "Examining the CDCynergy Event Assessment Tool," 352.

99. Cole, *Anthrax Letters*, 18.

100. Ibid.

101. Ibid., 17.

102. North, et al., "Concerns of Capitol Hill Staff Workers after Bioterrorism: Focus Group Discussions of Authorities' Response," 524.

103. Ibid.

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105. Ibid., 525.

106. One model that helps explain this behavior is the health belief model. It posits that people make rational choices based upon their "perceived susceptibility, severity, benefits, constraints, and self efficacy." (Linda Aldoory, and Mark A. Van Dyke, "The Roles of Perceived 'Shared' Involvement and Information Overload in Understanding How Audiences Make Meaning of News About Bioterrorism," *Journalism & Mass Communication Quarterly* 83, no. 2 (Summer 2006), 348.) In other words, people evaluate the available information and make health choices based upon their assessment. In all three cases, many people relying on government instructions or media

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185. Ibid.

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187. Bradley D. Stein, Terri L. Tanielian, David P. Eisenman, Donna J. Keyser, M. Audrey Burnam, and Harold A. Pincus, "Emotional and Behavioral Consequences of Bioterrorism: Planning a Public Health Response," *The Milbank Quarterly*, 82, no. 3 (2004), 413-455. Stein, et al., wrote that there are "no empirically based articles documenting the emotional and behavioral reactions of direct victims of bioterrorist events, including populations exposed and treated during the anthrax attacks of the fall of 2001 in the United States."

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190. Kaplan and Marshall, *Cult at the End of the World*, 251.

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192. Murakami, *Underground: The Tokyo*, 47.

193. Ibid.

194. Ibid., 168.

195. Graham, "Victims of Radiation," A025.

196. Petterson, "Perception vs. Reality," 84.

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203. There are current prohibitions against the U.S. military performing law enforcement duties domestically. This policy needs to be reviewed and revised in order to more effectively respond to serious CBRN events and other disasters.

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