

# VIEWPOINT

## Terrorism and Dispelling the Myth of a Panic Prone Public

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### ABSTRACT

Governments and commentators perceive the public to be prone to panic in response to terrorist attacks – conventional or involving chemical, biological or radiological weapons. Evidence from five such incidents suggests that the public is not prone to panic, although people can change their behaviours and attitudes to reduce the risk of themselves being exposed to a terrorist incident. Behavioural responses may be divided into acts of omission, such as not making unnecessary journeys, and acts of commission, such as taking prophylactic medication despite the inherent risk of side effects. Evidence suggests that the public are aware of these differences, and tend to adopt responses proportionate to the risk. Drawing upon the literature in the social and natural sciences, our discussion encompasses differing risk perceptions of terrorist threats and consequences of attacks. How do fear and anxiety interact with behavioural responses to amplify or attenuate perceptions that can be modified through risk communication undertaken by authorities?

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### INTRODUCTION

The perception of the public as inherently prone to panic in the face of scenarios such as a chemical, biological, radiological (CBR), or mass casualty conventional terrorist attack is pervasive. In the aftermath of the failed 21 July 2005 London bombings, for example, the UK media reacted with headlines such as “Eyewitnesses Tell of Panic and Confusion” and “Panic as London is Hit Again” (1,2). Recent articles in the medical press have warned us that “panicking

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citizens” are irrationally buying-up drugs from unscrupulous internet suppliers in preparation for pandemic avian influenza (3), and that in the event of a bioterrorist attack “even if casualties were to be low, it is more than likely that panic and civil disruption would prevail” (4). Not limited to the media, such views may have influenced recent UK public policy. Critics have accused the government for basing its recent civil contingencies legislation partly on the premise that large gatherings have a tendency to act illogically and instinctively in the event of an emergency. These situations may, therefore, need to be controlled or restricted if order is to be maintained (5).

To what extent is this widely-held perception of the public valid? Previous analyses focusing on public response to fires or other civil disasters, or soldiers’ responses to combat, have suggested that panic is more notable for its rarity than for its common occurrence (6). During the air raids on British towns in World War II, large scale panic, or precipitate, unreasoning behaviour, were rare events and only occurred in defined circumstances (7).

By evaluating public reactions to terrorism or CBR releases in a limited number of case studies, this paper adds to the literature by proposing that panic remains rare in these scenarios. Instead, we suggest that although the public may change their behaviours or attitudes, in ways that might be viewed as irrational by public authorities, to reduce their risk of being personally exposed or threatened by terrorism, these actions tend to have an internal logic and as such are amenable to change. Assumptions of panic may therefore be counterproductive.

While our discussion centres on providing a wide-ranging perspective of the public’s response, it needs to be kept in mind that social and cultural backgrounds between and within countries may influence the behavioural responses to terrorism, and this should be factored to ensure effective terrorism risk communication strategies. Rather than one cohesive “public”, there are many different sectors within societies based on different demographic, social, psychological, and medical characteristics. While recognising this, our discussion draws on findings about behavioural reactions from diverse studies to augment our understanding of how populaces may respond to conventional and non-conventional terrorist attacks.

## DEFINITIONS OF PANIC

*Psychiatric and psychological definitions*

The word *panic* is used as short-hand in various contexts to imply subtly different things. Within psychiatry the word is most often found in the context of “panic attack” or “panic disorder” and used to denote an episode of severe anxiety, usually also involving a cognitive component such as a fear of dying or of losing one’s sanity. Repeated occurrences of such episodes can be a source of great distress and disability, and as such, a large literature has built up concerning the psychological and pharmacological treatments to alleviate them. When applied to a population, however, “panic” takes on more behavioural overtones. During an emergency evacuation, for instance, the presence of heightened anxiety and distress among the evacuees combined with a fear of dying is not sufficient to label them as panicking. Panic in this sense demands four additional factors (8): a hope of receiving apparently scarce or dwindling resources; a focus on achieving personal safety instead of assisting others; a degree of contagiousness; and the adoption of irrational behaviours.

This final, irrational, element is particularly important, but is often misapplied. One set of behaviours might be construed as the best actions by emergency planners, journalists, or public health officials in possession of all the relevant information, with sufficient time to make an informed choice, and possibly also the benefit of hindsight, but these behaviours will not necessarily appear to be the best actions to someone denied these resources and having to make rapid decisions under intense stress. Incorrect decision-making due to incomplete information or insufficient resources is not the same as irrational decision-making and as such is not sufficient to categorise someone as panicking (8).

Panic defined thus may incorporate a range of responses to CBR or mass casualty incidents. The presence or absence of panic may be critical affecting morbidity and mortality in the immediate period following an explosion or an overt release of CBR material. Evacuations occur and people either remain in place for decontamination or disperse, taking with them CBR materials to which they may have been exposed. In the medium term, panic may also have the potential to affect the wider community. Anxious individuals

may adopt irrational behaviours that are to the detriment of society in order to safeguard their own health. Refusing to attend work at hospital for fear of infection, self-medicating with potentially harmful drugs, or avoiding air travel or tall buildings following 11 September 2001 are examples of behaviours that might be construed as panic. We question how valid and how useful the term is in describing such scenarios.

*Social science (international relations)*

Political science and international relations touch upon the psychological dimension of strategic terror in many books and articles. Yet these scholars use terms like panic with very little if any evidence to back up assumptions or to define what is meant. Often the public is seen as prone to panic, particularly when exposed to non-conventional attack. Empirical evidence from the behavioural sciences, and public opinion polls that have measured changes in a targeted populace's daily routines state otherwise.

Policy makers and the media have contributed to a perception of a public prone to panic and descend into lawlessness. This may, in turn, have heightened the public's concerns and influenced behaviours and attitudes. In June 2001, the US government ran a bio-terrorism exercise called Dark Winter, where Iraqi terrorists launched a smallpox attack in the US. The scenario depicted the public as panicking in the face of an out of control smallpox epidemic spreading across America. Essential services were in disarray. By portraying the public as prone to panic, the scenario may have heightened the public's perception of the threat of bioterrorism. The perceived threat of Iraq's biological weapons programme in the run up to the 2003 invasion, the development of a smallpox vaccine stockpile in the US, and the beginnings of a vaccination campaign for Americans, contributed to a populace increasingly concerned about contracting smallpox, as reflected in a late 2002 national survey. Americans began considering smallpox vaccination for themselves (9,10).

A further example of a public portrayed as fragile occurred when the US ABC television network aired a show in May 2006 on pandemic influenza titled *Fatal Contact: Bird Flu in America*. When the pandemic struck the US, civil order broke down as the public

health system became overwhelmed, health workers refused to work, National Guardsmen were attacked by civilians who hijacked vehicles carrying vaccines, and one state governor became paralysed in his decision-making.

The lack of credible supporting evidence in political science means researchers need to question the robustness of some commentators' assumptions of disorder and disruption to civilian life generated by what is referred to as panic. In 1996 Walter Laqueur, writing on terrorism, stated that from "the single successful [WMD] one could unleash far greater panic than anything the world has yet experienced" (11). Kupperman and Trent note that chemical and biological weapons stir deep public fear because of misperceptions and popular acceptance of half-truths about the potency of nerve gas and the ease with which plagues of medieval scope could be engendered and propagated. Thus, the mere threat by terrorists to use such weapons could well breed "panic" (12).

Jessica Stern in her study *The Ultimate Terrorist* (13) argues that a CBR attack on a society is likely to be severe and would lead to panic. Chris Dishman, one of the few political science scholars not to take the panic prone public perspective, correctly observes that, were Jessica's Stern's observations to be true, then panic and paranoia would surely have been expected among Tokyo residents following Aum's subway attack four years earlier (14). As will be discussed, evidence suggests this did not materialise.

A likely explanation as to why the behavioural sciences have only marginally been incorporated in thinking about these events can be gleaned from Paul Wilkinson. Writing on terrorism, Wilkinson observes that "quantifying the terror of terrorism is a complex issue because of its subjectivity – a possible reason to why other commentators have not focused on the fear and anxiety of terrorism (15)." He adds that it is the "interplay of these subjective factors and individual irrational, and often unconscious, responses that makes the state of terror, extreme fear or dread a peculiarly difficult concept for empirical social scientists to handle."

Evidence from the 1995 sarin attack, from 9/11, from the 2001 anthrax attacks, and from the 7 July 2005 London bombings suggests that panic does not typically break out following a CBR terrorist strike or a mass casualty conventional attack. Society is reasonably resilient. A note of caution must be sounded, as some uses

of CBR weapons in the past have clearly resulted in panic. Evidence from poison gas use during World War I suggests that panic may occur when appropriate counter measures are unavailable, or where the weapon is particularly unfamiliar. Before turning to the case studies, however, our discussion will initially cover risk perceptions and the psychological threat of CBR weapons.

#### RISK PERCEPTION

Following a terrorist attack, particularly one involving dispersal from a CBR weapon, the fear of the unknown and the high degree of uncertainty surrounding the lethality of the device, may combine with lack of public understanding of the risk, to influence the public's response and recovery, and cause other psychological effects. Understanding and respecting the way people make risk judgments, together with their levels of fear and anxiety following an attack, can provide insight into their behaviours and attitudes.

Research through decades has shown that people's perception of risk will be magnified primarily by two factors termed "dread risk" and "unknown risk (16)". Dread risks tend to be uncontrollable ones that entail fatal consequences, have high catastrophic potential, and are manmade rather than naturally occurring. Unknown risks reflect concerns that the effects are unobservable, delayed, unfamiliar, or novel and whether they are unknown to science. A terrorist attack, particularly one involving a CBR dispersal mechanism, is likely to score high on these two risk factor scales. It may lead to high anxiety and avoidance behaviour. Research has shown that Americans reduced their air travel immediately following the terrorist attacks on 11 September 2001 (17), a behavioural response that went against official advice, but which is understandable considering that no one knew with any certainty the real threat posed by further potential acts of terror using aircraft (18).

Given the lack of knowledge of when, where, and the severity of an attack involving non-conventional weapons, dread risk may remain high as the aftermath threat persists beyond the initial act. An attack using conventional explosives, for instance, happens at a point in time, threatening life and property only at the time the device detonates (and the consequential damage this may cause), although the perceived threat by the public of further attacks may remain.

After the 7 July and 21 July attacks in London, for example, a perceived threat of further strikes persisted. A CBR attack on the other hand, is much more likely to carry a continued actual or perceived threat (to varying degrees depending on the nature of the device and dispersal mechanism). CBR incidents fall more often in the dread and unknown risk categories because of uncertainty over medium and longer term threats. Perceived long-term risks do not merely relate to the risk of death. Although important, public fears over CBR also relate to the long-term risk of reproductive and fertility problems, birth defects, cancers, and the appearance of chronic, yet medically unexplained symptoms and syndromes (19). As illustrated by the recent debates over genetically modified (GM) foods, childhood vaccination, mobile phone masts, and pesticide spraying, modern Western societies are already particularly uneasy about the unknown long-term risks posed by “unnatural” chemical, biological, or radiation-related exposures (20). By exploiting these fears, CBR terrorist events are pushed even further along the dreaded and unknown risk axes.

The actual short and long-term physiological health problems posed by a non-conventional attack would vary greatly depending on the nature of the device, when and where it was detonated, and the response by authorities. While a sarin device may pose only a short-term threat, and can be decontaminated easily, there could be the public perception of further health risks among those exposed or those living or working in the area attacked. Similarly, a radiological attack released by an explosive device may cause fatalities in the immediate vicinity and render a certain area uninhabitable for several years, but will neighbouring areas deemed “safe” by authorities be perceived as so by the public? Perceptions may cause further health problems. A biological attack with a viral pathogen or the destruction of a chemical plant releasing toxic gasses could cause significant loss of life and longer-term physiological complications, including heightened perceived risks and their consequences. We discuss the longer-term consequences of non-conventional weapons and their apparent physiological manifestations in the next section.

Risk perception studies within a theoretical framework called the “social amplification of risk” describe and model the impact of accidents and other adverse events. This research provides insights by studying “signals” giving rise to ripple effects that extend beyond

damage encountered directly and immediately. Thus, results may encompass many other victims (21). According to this theory, social interactions, for example, between institutional actors such as government officials, the mass media, first responders, and members of the public may amplify (or attenuate) psychological, social, physical, and economic impacts of an incident as part of an ongoing process of “risk communication” that flows among and between the members of a society. In the aftermath of a terrorist attack, for example, public confidence and trust in the competence of government to protect its citizens may be shaken. Public concerns can prompt governments, in an attempt to ensure the safety of citizens, to invoke restrictive countermeasures that may unfortunately impinge upon human rights and civil liberties. Communities in areas directly affected by attacks, may be stigmatised, not only in the short term, but also over time, to the detriment of local economies if people are no longer confident they can visit safely.

Attempts by government institutions to mitigate such potentially harmful impacts have focussed on the use of *organisational risk communication* as a tool to promote informed, effective, decision-making by individuals potentially affected by risk. Modern thinking by scholars, such as Baruch Fischhoff (22), on the use of organisational risk communication in relation to terrorist incidents has centred on three themes:

- managing risks well so as to have a credible message to communicate;
- creating appropriate communication channels; and
- delivering decision relevant information.

Effective risk communication involves not only providing people with the facts they need to make choices among the options facing them, but also fostering “two-way” communication channels that allow citizens to be partners in managing risks, while sharing of information about themselves. Effective risk communication also requires being candid about what is known and the quality of the information being provided. Unnecessary delays, leading to information vacuums, communicating risk in a restrictive “one-way” fashion, and attempting to cover-up facts have been demonstrated, in certain circumstances, to alienate concerned citizens, causing



public distrust, threatening the perceived legitimacy of government agencies (23).

While emergency services respond admirably in most times of crisis, government institutions have not been immune to communication deficits after terrorist attacks or during public health epidemics. Commentators observed, for example, that after the World Trade Center was hit, it took four hours before any initial assurance was given by US President Bush that he was safe and actively working to address the crisis. In subsequent days, federal officials provided little information to help the average citizen know what her or she could personally do (24). Restricting information about the true nature of an emergency can also harm the health of citizens potentially exposed to chemical, biological, or radiological materials, those who might otherwise have been able to recognise symptoms and seek medical attention sooner. In a review of three epidemics – the 1979 anthrax outbreak in the USSR, the 1972 smallpox epidemic in Yugoslavia, and the 2001 US anthrax postal attacks – Guillemin (25) has underscored how government pre-occupation with maintaining secrecy led to failures to engage in open and complete communication. Failure to discuss how to contain a disease outbreak probably increased the likelihood of death and disease.

In the 1979 anthrax outbreak in the USSR, cultural factors had a clear impact on public health responses. It was a time when stoicism and resilience were encouraged, but individual suffering and discourse were not so highly valued. Indeed, post-traumatic stress disorder was simply unknown and did not exist even as a concept (26,27). Although these cultural underpinnings enabled authorities to mobilise public health resources (which were very well developed in Soviet times) rapidly and to restrict population movements, aided initially by public trust in the crisis response system, authorities could not halt rumours or a sense of fear and conspiracy. In the aftermath, these perpetuated a lack of trust in Soviet forces, both at home and abroad (25).

When authorities attempt to minimise undue alarm or panic by restricting information about risk, they fail to recognise that they are undermining their own credibility and increasing public distrust (28). Distrust in government agencies and officials caused by such incidents is known to heighten perceived risks (29) and to hinder

future public health efforts, especially those which rely upon the voluntary cooperation of the public. Failure to administer the combined measles mumps and rubella (MMR) vaccine among the population of children living within the UK, for example, then led to local outbreaks of measles, a disease that had by and large been successfully eliminated previously (30).

Deficiencies in official responses outlined above need not be inevitable. To help public institutions communicate risk about terrorist attacks more effectively, it should be possible to apply the wealth of knowledge and lessons from public health research and practice, and from natural hazard and risk research fields.

#### PSYCHOLOGICAL REACTIONS TO CBR

In addition to the risk analysis literature on the study of threat perceptions, the psychological and psychiatric literature also offers a valuable insight into potential public reactions to CBR terrorism. Several studies link these reactions to the psychological threat posed by chemical and biological weapons (31,32). Such weapons have been noted to “engender fear out of all proportion to their threat” (33), being as much, if not more, weapons of psychological warfare than physical warfare (34). Even in military training, as many as 20% of those who took part in exercises using simulated exposure to irritant gases showed moderate to severe psychological anxiety (35).

Even in the absence of panic, the deliberate use of a CBR device against the public will almost certainly generate heightened anxiety. The underlying reasons behind this can be captured from the complex relationship between environmental concerns and symptoms. No doubt, being exposed to an environmental hazard, such as chemicals, can lead to increased fears and concerns among the public (36). This response occurs whether or not the exposure is real or perceived. Fears can in turn affect health responses, in particular increased reporting of somatic symptoms. Several mechanisms explain this important effect, including increased health monitoring by those exposed to the incident; reattribution of pre-existing symptoms among the affected population; and somatisation of the symptoms of psychological distress (37). One recent study, for example, has demonstrated that the strength of an individual’s pre-existing concerns regarding environmental matters such as pollution,

food additives, pesticides, and GM food predict subsequent symptom reporting following local pesticide spraying (38). Individuals who describe themselves as “very worried” about local environmental conditions are ten times more likely to complain of headaches than those not so concerned (39). Media reporting emphasising the health risks of a substance can also increase the number of symptoms reported by those exposed to it (40).

Psychological reactions are not always transient. Prior to the 1991 Gulf War, during Operation Desert Shield, fears about the possibility of chemical or biological weapons ranked highest in the list of concerns reported by military personnel (41). It is generally agreed that Iraqi forces did not use these weapons. Yet even a decade later, nearly two thirds of US personnel deployed to the Gulf now report that they believed that there had been such as use (42). Such a belief is neither trivial nor benign, rather it is associated with disability (43). When asked why they believed that they had been exposed, many answered that it was because they were still experiencing physical symptoms. This was proof that they had been exposed to chemical or biological agents. A direct causal pathway can exist in which the threat of CBR produces substantial anxiety, that in turn produces physical symptoms, that serve as affirmation that the individual has indeed been the victim of a CBR attack.

#### CASE STUDIES – EVIDENCE OF PANIC?

We describe five case studies encompassing conventional and non-conventional devices to provide examples of the behavioural responses by the targeted populace and the wider community. Evidence includes qualitative material from first hand accounts and observations by the emergency services plus quantitative data from mental health surveys and public opinion polls.

##### *1995 sarin attack*

The religious cult Aum Shinrikyo successfully released sarin, a nerve gas, against the Japanese public with their attacks on Matsumoto on 27 June 1994 and Tokyo’s subway system on 12 March 1995. We discuss the sarin attack in Tokyo, not Matsumoto. According to Tokyo police records the attack caused 12 deaths and 3796 people

went to medical establishments for treatment. From the personal accounts given by those in the contaminated subway carriages and stations, there was no real sense of panic during the attacks. Individuals responded in an orderly fashion as they were evacuated from the affected areas. A commuter on the Marunouchi line when asked by the police if people panicked recalled “Everyone was so silent. No one uttered a word.” Even though she knew it was sarin poisoning, because she had read before that Matsumoto victims reported pupil contractions, she felt “extremely calm” (44). A passenger on the Hibya Line remarked that as he walked through the station with collapsed people lying around, not knowing if they were alive, “I still didn’t sense any danger. I don’t know why. In retrospect that seems odd – why wasn’t I afraid? – but then neither was anyone else.”

A firefighter who responded to the incident later recalled that above ground, people coming out of the contaminated subway remained silent. He had never experienced such a scene: “just victims’ coughing heard in the perplexing scene”. The same was reported in hospitals where victims waited patiently to be treated (45).

Victims noted that the only time they felt considerable fear was when they had difficulty contacting the emergency services and when it seemed a long time for first responders to arrive on the scene. A commuter on the Marunouchi Line platform recalled that only when nobody answered the emergency phone did she then “feel real fear”, adding, “Everything I had believed up until then just crumbled. From that moment on, it was total chaos” (44).

Communication responses by the authorities arguably exacerbated fears and anxieties. According to Robyn Pangi, there were false announcements on trains, adding to victims’ and responders’ confusion. To the wider populace of Tokyo, television footage on the morning news showed confusion and chaos and may have exacerbated the nervous frustration of victims and concerned parties: victims were shown becoming ill, staggering around the city, and searching for answers (46). Over the following days, inadequate information and lack of openness, served according to Pangi to “perpetuate the general fear within the population and among victims, who only knew that the perpetrators were at large and thus could launch a follow-up attack” (46).

Despite the lack of panic during the evacuations, a large number of passengers did incorrectly believe that they had been exposed to sarin. Approximately 5500 people went to 280 medical facilities in the days following the attack. Total “poisoned” victims, as summed up in the police record, was 3795 of whom 1046 required hospitalisation – some for no more than a few hours, but some for many days (45,47). Just 12 were killed. By implication, more than 1705 (31%) who arrived at medical facilities believed they had been exposed to sarin but did not require treatment for exposure, and 2749 (72%) categorised as “poisoned” by the police did not require hospitalisation.

#### 9/11 WORLD TRADE CENTER ATTACK

Since 9/11, published studies provide valuable empirical evidence on the impact a major mass casualty conventional attack can have on a targeted populace and the nation as a whole. Evidence suggests that there was no overt panic in the self-evacuation of the World Trade Center (WTC). Many pre-existing social networks within the buildings may have prevented panic (48). An orderly evacuation of the towers had also occurred after the 1993 bombing of the WTC (49). Several lines of evidence suggest that the existence and behaviour of social groups plays a greater role in determining whether panic ensues than the response of the authorities during an emergency (6). Military leaders’ perception that established units are less likely to panic under fire than newly formed units where members have yet to bond with each other also appears to hold weight in civilian life. The presence of familiar people can have a remarkably calming effect during an emergency, so much so that people will sometimes delay evacuating dangerous situations, or even *enter* dangerous situations, in order to maintain a personal bond with someone: actions noted during the 9/11 evacuations.

Even among those trapped above the impact zone, where escape was impossible, very few exhibited panic, because they believed they had a chance of making their way out alive (50). The National Research Council of Canada analysed 324 first-hand accounts from those who survived the WTC attack. Although 83% deemed the situation “very serious” in the first few minutes, seeing flames, smoke, or falling paper, only 55% of these survivors evacuated

immediately, 13% stopped to retrieve their belongings, and 20% secured files and searched floors before evacuating. Initially 8% decided to stay but changed their minds, and 4% were trapped due to collapsing ceilings and walls, but then managed to escape (51). Many commented how calm and helpful the occupants were during the evacuation. Across New York, individual volunteers and organised groups converged on the epicentre of destruction to offer aid and support, despite hazardous conditions and uncertainty about the risks of further attack and or structural collapse of the towers (49).

While Americans believed that ordinary citizens behaved responsibly rather than panicked, the attacks left a psychological scar. Many Americans changed their behaviour to minimise the risk of terrorism to themselves. How did the perceived personal risk noted in the surveys manifested itself into changing Americans behavioural patterns? A survey of three counties near Manhattan (October 20–November 11) revealed that a large number of people changed their everyday lives, becoming more risk averse (52):

- 26% delayed or cancelled plans to travel by air,
- 7% changed their upcoming holiday plans,
- 18.5% drove into Manhattan less often,
- 17% used mass transportation into Manhattan less often.

A separate survey of national trends discovered that in January 2002 13–14% of Americans had altered their travel plans since 9/11 and 5–7% had “stopped flying altogether out of fear (53)”. The US Air Transport Association revealed that after the re-opening of US airspace following 9/11, passenger traffic was down by almost 40% compared to the same period the year before. It gradually recovered to a 19.8% decrease in November and 14% in January 2002 (53). A year after the attacks a survey conducted by the *New York Daily News* in August 2002 found that New Yorkers maintained alterations in their daily lives. Eleven percent were making an effort to avoid potential terror targets, such as subways; 23% avoiding tourist sights, and 20% tall buildings (54).

#### ANTHRAX

The use of the US postal system to attack media and government institutions with anthrax, killing five people in October to November

2001, exposed America to a new type of threat, one the country was not fully prepared for or fully understood. At first, as Federal authorities had warned, the White House believed that the attacks were part of a second wave of al-Qaeda strikes or a diversion for an attack of far greater magnitude. During the anthrax attacks, Americans remained calm albeit concerned about personal safety – in contrast to some public officials' expectations of panic. The large-scale publichealth campaign was orderly. Hundreds and sometimes thousands of people waited in line for long periods (55). Despite reports by the media of a reactive and hysterical public, the populace exhibited steadfastness in an environment of uncertainty. Americans did change their behaviours and attitudes to reduce the risk of being exposed to anthrax, but these reactions cannot be regarded as panic, rather rational actions.

Nationally, 57% of Americans changed their behaviour to minimise their risk of contracting anthrax: 12% avoiding public events; one-third exercised caution when opening mail with 30% washing their hands afterward, and 6% wearing gloves (56). In the New York area, 55% reported handling the mail at home more carefully as a consequence of the news of anthrax contamination (52).

One common perception of America's reaction to the anthrax attacks is that a large number of Americans acquired a prescription for antibiotics. The Centers for Disease Control and Prevention (CDC) recommended three antibiotic drugs that could each treat anthrax: ciprofloxacin, doxycycline, and amoxicillin. CDC, itself, advised 10,000 people who were potentially exposed to anthrax in Connecticut, Florida, New Jersey, New York City and Washington DC to take the 60 day treatment (57). A retrospective national comparison of prescriptions for these three medications in October and November 2001 with the same period in 2000 demonstrated that only moderately more people filled prescriptions after the attack than a year before, a small number compared to the size of the US populace; not the common perception of panic buying. Compared to 2000 levels, ciprofloxacin prescriptions were 40% higher in October 2001, doxycycline increased by 30% during October–November. This corresponded to an increase of 160,000 prescriptions for ciprofloxacin in October, and 216,000 to doxycycline during October–November (57)– 376,000 extra prescriptions during

October–November 2001 over the year before. If each prescription was filled by a different individual, this represents only 0.13% of the US population. These figures do not include the 10,000 prescriptions recommended by CDC, which came from the National Pharmaceutical Stockpile.

Americans were at relatively low risk of contracting anthrax or smallpox, yet a survey by Blendon *et al.* at Harvard in October 2001 showed that 57% had taken one or more precautions in response to reports of bio-terrorism, but stopping short of taking antibiotics. Just 37% took precautions when opening the mail, and 25% maintained emergency supplies of food, water, or clothing (58). Blendon *et al.* concluded that Americans were not “panicking,” based on the fact that only 13% were taking three or more of the 12 precautions shown to those interviewed, (3% purchased a weapon) and 43% reported doing none of them. The latter figure is arguably the more revealing because it suggests that despite the ambiguity over how the attacks would evolve and the lack of effective risk communication measures, many Americans felt it was not necessary to take excessive precautions. While not panicking, a large proportion did, however, feel it necessary to change their behaviours and attitudes to reduce what they perceived as the risk of being personally exposed to anthrax and terrorism. With only 13% having taken three or more of the 12 precautions about which they were queried, the vast majority of Americans did not, it appears, take disproportionate actions to ensure their safety.

CDC and others now concede a mistakes in risk communication. Ciprofloxacin and doxycycline are equally effective against the strain of anthrax implicated in the outbreak, but doxycycline had fewer side effects, was less expensive, and was in greater supply. Yet CDC initially advised using ciprofloxacin in the early stages of the anthrax attacks, followed by doxycycline once susceptibility patterns for the isolated *B. anthracis* strains were known (57). Postal workers who handled anthrax contaminated letters were provided doxycycline, while Senators and media executives, at risk from the same strain, were given the more expensive Ciprofloxacin. In the words of Marsha L Vanderford who co-wrote the CDC advisory, CDC “forgot to ask how postal workers might interpret the message on a relational level. Why had CDC recommended cipro to television executives, but a less expensive



drug to postal workers? (59)". Consequently postal workers complained they were being treated as second-class citizens, believing they were being given a less effective drug for fiscal reasons. Another explanation favoured by the postal workers was that they, unlike the Senate staff, were largely African-American. As we have learned from the natural catastrophe of Hurricane Katrina, not only terrorism, if mishandled, can exacerbate pre existing social fault lines. This may be particularly true where the event itself, through bad luck, poor planning, or deliberate targeting, has a disproportionately large impact on specific sectors of society. This differential effect may not be fully recognised in official responses (60).

#### 7 JULY 2005 LONDON BOMBINGS

The 7 July bombings in London resulted in 56 fatalities. Approximately 700 people attended hospital for a variety of injuries. Research into the immediate reactions of those trapped on the three underground trains that were bombed is still on-going. First-hand accounts given in media interviews suggest that the public responses could be better characterised by themes of cohesion, unity, and mutual co-operation, than by any sense of panic (see Box 1).

We know more about the short-term psychological impact of the bombings on the general adult London population. Our group conducted a telephone survey of a representative sample of 1010 Londoners 11–13 days after the attacks (61). Approximately one third of the population were reporting symptoms of substantial stress as a direct result of the attacks. When asked whether the attacks had had any impact on how they intended to travel once the public transport system was up and running again, 30% said they now intended to travel less often by tube, 13% less often by train, and 20% less often into Central London. Whether these intentions have translated into behavioural changes remains the focus of on-going research. However, year on year user data collected by the underground network suggest that tube use returned to expected levels within three months.

Box 1: Did passengers panic? Selected quotations from tube passengers on 7 July 2006 reported in the British media

- “There was no real panic – just an overwhelming sense to get out of the station quickly”
- “Almost straight away our packed carriage started to fill with smoke, and people panicked immediately. Thankfully there were some level-headed people on the carriage who managed to calm everyone down”
- “I felt there was a real sense of unity. We were all trying our best to find a way out of there and reassure each other”
- “One of the things which struck me about this experience is that one minute you are standing around strangers and the next minute they become the closest and most important people in your life. That feeling was quite extraordinary”
- “Many people kept calm and tried to help one another to see if anyone was injured”
- “Passengers with medical experience were found, I found a tool box and we smashed a window, allowing the medical guys to enter the other train”
- “I was very aware of people helping each other out and I was being helped myself”

#### CHEMICAL WEAPONS DURING WORLD WAR I

Panic *is* believed to have occurred among a targeted group, the targets of gas attacks against German and allied forces during World War I (WWI). According Carol Fullerton *et al.* and Tim Cook, the use of gas led to panic, dread, and significant fear, and anxiety (62,63).

The first use of gas as an offensive weapon occurred in April 1915 by German forces against two French divisions at the first Battle of Ypres. It suffocated hundreds, caused massive panic, routing the troops from the front (63). In WWI, lethal gas was new, so there was the fear of the unknown as well as the panic in response to a situation that soldiers were not trained for nor protected from (62).

Gas attacks posed a high dread and fear factor. Panic spread throughout the ranks and in the chaos of what was happening, soldiers ran in all directions, wild with confusion (62).

Two days later, a Canadian division sent to replace the French troops was also subjected to a chlorine gas attack. Quick thinking officers and men placed water and urine soaked rags over their mouths – a crude protection against the effects of chlorine. Despite panic, soldiers were able to think through rationally their response and adapt crude protective measures. With the threat of further gas attacks, crude cotton pad masks were issued within days of the first gas attack and by the end of 1916 nearly impervious respirators were in use. By 1918, the properly worn masks were very effective and were approximately 99% efficient (62).

Despite the distribution of respirators, soldiers found there was no place to run and they could only wait for the chemicals to move through the trenches (52). Even the early morning mist reportedly caused panic because of the ongoing dread and fear of further gas attacks (63). While it took until 1916 for steel helmets to be issued to reduce head wounds, protection against gas was seen as essential from its first use, necessary to ensure the confidence of troops was not undermined by gas. Commanders believed that if soldiers thought they were defenceless, they might panic or retreat (64). A rapid arms race ensued: more effective gases to circumvent protective measures and then more sophisticated countermeasures. As the war wore on, chlorine was replaced by the deadlier phosgene and diposgene; and sneezing and choking gases and dusts were introduced to force soldiers to remove their respirators so that they would fall victim to lethal agents (65). The introduction of mustard gas in the summer of 1917 forever changed gas warfare, as it burned and blistered the skin, thereby negating the psychological protection of the respirator (65). Gas served as a constant psychological and physiological weapon of attrition, impeding soldiers ability to carry out their operations as they wore the cumbersome protective equipment. By the end of the war a million casualties had been caused by gas.

Despite evidence of panic and dread caused by the WWI gas attacks, we urge caution when transposing these findings to the possible consequences of a terrorist chemical weapon strike. The quantity of gas used in any one WWI attack was considerable; probably far exceeding what could be unleashed by a terrorist strike.

Despite the religious cult, Aum Shinrikyo, establishing a chemical weapons (CW) plant to produce sarin and 37 companies to support its CW programme – these activities almost unheeded by authorities – they produced just two gallons of sarin for their Tokyo attack, and it was only 30% pure and relied on a rudimentary delivery mechanism (66). Other terrorist groups may be more successful, but developing and unleashing a significant amount of a CW is complex. Nevertheless, we believe that WWI suggests that even reasonably trained forces with knowledge of mission and purpose, can on occasions panic. They then demonstrated rapid habituation and responded with countermeasures to the threat of gas warfare.

In the 21st century, the awareness by the public and particularly by emergency services of possible gas use as a terrorist weapon and the availability of decontamination equipment means this weapon is no longer so unfamiliar and without available protection or response. While still perceived with dread and fear and the potential to cause long term health damage, first-hand accounts from the 1995 sarin attacks suggest that panic is rare following a CW terrorist strike.

#### CONCLUSION

The public's response to terrorist attacks can be divided into two parts: immediate, and short to medium term. The evidence we have presented suggests that in the immediate aftermath of an attack, the public is fairly resilient, calm and rational in its reactions. Those in the World Trade Center collected their belongings and secured filing cabinets. Only half evacuated immediately despite the sight of flames and smoke. Commuters on the metro trains in Tokyo and London attacked with chemical and conventional explosives reported that many of those around them were calm and showed unity and mutual cohesion in the immediate aftermath. Only when emergency services assistance was delayed did heightened fear and anxiety begin to set in.

In the days and weeks following the attacks, the targeted populace tends to change their behaviours and attitudes in accordance with their perceived risk perceptions to reduce the risk of personally being exposed to further terrorist attacks. One frequent consequence is cancelling, changing or delaying travel plans on the targeted transport system and to the location of the attack. Following 9/11 airline passenger numbers were significantly lower than normal in

the months after the re-opening of US airspace, metro ridership was down in Tokyo and London following those attacks, and many Americans took precautions during the anthrax attacks.

Behavioural responses can be divided into acts of omission, such as not making unnecessary journeys, and acts of commission, such as taking prophylactic medication despite the inherent risk of side effects. In general, evidence suggests that the public are aware of these differences, and tend to adopt responses proportionate to the risk. Thus while a sizeable minority of Americans were more cautious in handling mail, and many large corporations such as the New York Times moved to a paperless and hence letterless office (a trend that may have been inevitable anyway), very few took the less measured response of taking antibiotics, and probably many of those who did, did so after receiving medical advice.

Despite evidence to suggest that panic does not occur following terrorist attacks, we should learn whether the culture and social background of the targeted populaces in our selected case studies might have influenced the behavioural reactions. In the sarin, 9/11, and 7/7 studies, those attacked were generally of middle class, commuting or at the office, likely to have been accustomed to rational, well structured co-operation with authorities. During the anthrax attacks many of those caught up were from media outlets or Congress, or postal workers.

Perhaps Londoners have become somewhat accustomed and resilient to conventional weapons terrorist attacks following the IRA mainland bombing campaign. Perhaps the proverbially dutiful Japanese workforce encouraged a moderate behavioural response to the sarin attack. Surely, further research to understand how social and cultural backgrounds within and between countries affects risk perception of terrorism threats and attacks would be of considerable value for developing effective risk communication strategies. These rely on understanding how stakeholders frame their perceptions. Research should also explore to what degree the availability of basic infrastructure – from medical services through to adequate food and shelter – may influence public reactions. The sarin case study showed that only when a commuter on a metro platform was not able to contact the emergency services did he or she then feel real fear. Following Hurricane Katrina, the lack of basic infrastructure may

have contributed to public reactions – first rational retreat then violence – among those left behind.

Panic is certainly not an inevitable response to terrorist incidents, and believing otherwise may be counter productive, obscuring the ways in which public behaviours, concerns, and anxieties can be modified by effective risk communication. There is a danger of authorities believing that the public is prone to panic is a danger in itself. The authorities may refrain from providing sufficient and targeted information prior to and following an attack, for fear of “provoking panic”. The behavioural responses we have discussed in the case studies revolve largely around existing perceptions of risk amongst the targeted populace. The anthrax and sarin attacks were exacerbated by poor risk communication – a lack of information, mixed messages, or lack of awareness of existing perceptions and understandings. If the authorities (and the media) interpret rational behavioural reactions as panic, a further danger exists of a self fulfilling prophecy in which restricting or inadequately framing risk communication can lead to declining trust from the populace and a reduced likelihood that people will adhere to government advice. The “panic” responses in the examples follow rather predictable and explicable lines. Surely, authorities should move away from a perception of a panic prone public.

A nation’s preparation for terrorist attacks must include not only physical response mechanisms (medical care and emergency services), but also psychological measures (risk communication and targeted information). Effective risk communication could mitigate the adverse behavioural reactions that could undermine a nation’s response. Following a non-conventional attack, the populace would need to follow specific advice and instructions (e.g. evacuation plans, quarantine, vaccination strategies). To promote these desired behavioural responses, government can increase the public’s understanding of CBR terrorism without causing undue alarm. We advise increasing public knowledge, preparedness and alertness without causing anxiety and risk averse reactions: the UK government policy to assist a public to become “alert but not alarmed” is a reasonable aim, even if it remains unclear precisely how to achieve this. A wider information campaign might be developed to include basic protective measures the public could embark on in the event of a CBR attack, and what measures authorities could ask them to take. For instance,

those who have fled a radiological attack could be advised to take a shower at home in those first few critical hours. This would create a forewarned and forearmed populace with an awareness and knowledge base.

Of course, while general advice to the public in advance assist in the event of a major attack, many may not take notice of the information until an event has occurred or a threat has become imminent. Effective risk communication involves not just the provision of advance information and an understanding of the audience's perceptions. It demands providing advice when an event has occurred, getting the right information to the concerned public in a timely manner, and advising on which information portals to access from the media to government public information in hardcopy and electronic formats. User-friendly government websites will be needed, rather than fragmented and unclear content spread across a number of sites.

Following a CBR attack, fear of the unknown and a high degree of uncertainty about the lethality of the agent will combine with a lack of public understanding to complicate greatly effective response, recovery, and advice on what actions the public should take. Understanding and respecting the ways people make risk judgments as well as appreciating their fear and anxiety can help governments assist their populace frame risk perceptions (and ultimately behaviours and attitudes). Such perceptions, behaviours, and attitudes are critical for effective communication and engagement with the public following a major attack.

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