

PSYCHOSOCIAL CONSIDERATIONS FOR MASS DECONTAMINATION

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Mass exposure to explosions, infectious agents, foodborne illnesses, chemicals or radiological materials may require mass decontamination that have critical psychosocial implications for the public and for both traditional and non-traditional responders in terms of impact and of response. Five main issues are common to mass decontamination events: (i) perception, (ii) somatisation, (iii) media role and communication, (iv) information sharing, (v) behavioural guidance and (vi) organisational issues. Empirical evidence is drawn from a number of cases, including Chernobyl; Goiania, Brazil; the sarin gas attack in Tokyo; the anthrax attacks in the USA; Three Mile Island; and by features of the 2003 severe acute respiratory syndrome pandemic. In this paper, a common platform for mass casualty management is explored and suggestions for mass interventions are proposed across the complete event timeline, from pre-event threat and warning stages through to the impact and reconstruction phases. Implication for responders, healthcare and emergency infrastructure, public behaviour, screening processes, risk communication and media management are described.

INTRODUCTION

Radiological events, as well as some biological or chemical ones, require decontamination as treatment, mitigation or prevention. Protocols exist for isolated incidents and individual procedures as well as for deployable specialised small units as notably used for first responders, hazmat teams and military operations. However, mass decontamination involving large cohorts of the general public remains a gap in preparedness. Given the relative rarity of radiological and nuclear incidents, this paper proposes that the preparation should rely on a common platform of psychosocial considerations, with lessons learned from biochemical decontamination and infectious decontamination, informing in all hazards schema. The paper will present psychosocial considerations for a generic platform, followed by a discussion of six main psychosocial issues that are common to mass decontamination events: (i) perception, (ii) somatisation, (iii) media role and communication, (iv) information sharing, (v) behavioural guidance and (vi) organisational issues.

A GENERIC PLATFORM FOR MASS DECONTAMINATION

Indeed, although some aspects of radiological and nuclear decontamination require specialised training, there are other aspects of decontamination that are common to infectious disease control and biochemical decontamination. More specifically, common directives for decontamination across multiple hazards include basic protective behaviours such as proper hand washing, washing hair and body, covering nose

and mouth, changing clothing and prevention of inhalation or ingestion by avoiding smoking, drinking and eating. Using a common mental model of decontamination, similar to infection control, may help improve decontamination procedures because the practices are more familiar both to the public and to responders.

A common mixed platform for decontamination is comprised of both generic core principles plus hazard and organisation-specific protocols, which consider both physical and social issues in decontamination. Beyond the role of specific agent expertise to provide countermeasure instructions and recommendations, the deployment of mass decontamination will require significant human resources capabilities. Creating a generic personnel capacity pool to respond across radiological biological chemical (RBC) mass decontamination incidents may be improved if medical professionals and other personnel trained in infectious disease control are used as a second line of defence in response to assist the specific RBC experts. This pool can act as a group to draw on in event of a surge. Similarly, retired health and emergency professionals as well as pre-screened and -registered volunteers may also work as a third line of defence in events with a larger scope of impact⁽¹⁾.

Psychosocial considerations are a key component of this common platform⁽²⁾. Evidence indicates that the psychological impacts of chemical, biological and radiological agents are greater than the physical impacts^(3, 4). Hospitals are overrun with people neither clinically ill nor exposed who are seeking medical attention and check up. Estimates put the ratio of psychological casualties to physical

casualties as high as 500:1⁽⁵⁾. Compared with physical injuries, psychosocial effects occur across the event timeline, from pre-event threat and warning stages through rescue and recovery stages. Psychosocial effects may be observed in the public even in the absence of an actual occurrence, as ripple effects may occur from the threat of an event alone. Ripple effects involve multilevel effects that impact increasingly larger social systems beginning with individuals, and then rippling outwards to families, communities and finally to society as a whole⁽⁶⁾.

In describing psychosocial effects, it becomes important to note that disasters, including chemical biological and radiological threats, do not affect people equally. People are affected differentially by RBC events both socially and physically, some being at higher risk depending upon a multitude of factors, including age, socio-economic status, sex, education (especially literacy), occupation, health status, pregnancy, ethnic or cultural minority status, prior experience with similar situations, homelessness and pre-existing mental health problems⁽⁷⁻⁹⁾.

Psychosocial considerations rely on a set of basic principles: (i) perception matters, (ii) routine predicts behaviour, (iii) people act in purposeful and adaptive ways, (iv) people want to connect and help and (v) people are differentially affected.

PERCEPTION

Perceptions matter with respect to all extreme events, but they become particularly important when managing mass exposure or mass casualty situations. Chemical, biological and radiological threats are often silent, invisible, odourless or otherwise undetectable by human senses^(3, 10), making clear risk messaging all the more important in managing the perceptions of the public and in terms of their behaviour. Trust in the authorities become paramount in the context of uncertainty. RBC threats also have an unfamiliarity to the general public as many will not have had previous experience or exposure to similar experiences nor will they have had regular practice drills (as one practices in case of fire).

Behaviour, worry and public outrage are dependent upon these risk perceptions⁽¹¹⁻¹³⁾. Though the actual risk of a particular threat may be low according to expert knowledge, a layperson may not perceive the risks associated with that threat to be acceptable, regardless of the likelihood of the event occurring. Quantitative data will not have as calming an effect on a worried population as would an effective risk management strategy⁽¹⁴⁾. A lack of control, the level of dread, fairness, involvement of children, degree of familiarity, uncertainty and whether or not the event is intentional will all have an effect on the amount of public outrage^(15, 16). Actually, many of

these factors come into play with chemical, biological and nuclear threats⁽¹⁷⁾.

For example, following the Chernobyl accident in 1986, public outrage became an issue with respect to official directives regarding children and milking cows. Norwegian officials advised the public to keep their cows indoors for 6 weeks but children were allowed to play outside⁽¹⁸⁾. Nevertheless, about a quarter of the single mothers in Oslo would not let their children out to play. Moreover, this message outraged the public because it seemed that officials were more concerned about the cows than they were about the children. Had officials explained that the cows and the milk supply were at greater risk to radioactivity in the grass because cows eat the grass rather than simply walking on it, the public might not have reacted in the same way. A more appropriate approach to risk messaging in this situation is to explain the path of contamination, the vectors of risk and of protective factors, summed up as follows⁽¹⁸⁾:

You start by saying there is radioactivity in the grass, the cows eat grass, so this radioactivity will end up in the cow's milk. Now-, who will drink milk? The children will, and they concentrate this in their thyroid gland. In other words, in order to protect this [thyroid disease in children], to prevent this from happening, we will keep the cows out of reach of radioactive grass, but as long as children do not eat grass, they can play outside (105).

After the Chernobyl accident, public trust in officials was weakened because information about the event had initially been held back and because risks had been minimised⁽¹⁹⁾. This distrust compounded an already traumatic incident and the information vacuum led to rumours that increased public fears. This distrust in public officials with respect to Chernobyl has persisted over the long-term, demonstrating that improper risk communication can have long-reaching consequences.

At times, perceptions may also cause distrust in the very decontamination procedures, as was the case with the treatment of the Brentwood Postal Facility and Distribution Center workers following the anthrax attacks in 2001. Different antibiotics were distributed to Capitol Hill personnel compared with the postal office employees. The majority of workers at the Brentwood facility were members of a visible minority group and felt that race had been a factor in their treatment by officials⁽²⁰⁾. Additionally, the testing of postal facilities for anthrax spores caused workers' trust to wane as tests were conducted by individuals in full protective gear while workers continued their daily task relatively unprotected. One worker sums up the feelings of

betrayal⁽²⁰⁾, 'I felt angry and betrayed because there was a point where we would be at work and you would see people or teams come in hazmat uniforms, and we worked and suspected the danger' (212).

People have a tendency to inflate the risks associated with unfamiliar threats as well as threats with high dread factor, such as radiological or nuclear events, especially those involving children⁽²¹⁾. Patterns of dispersal add to the level of uncertainty as the public may not know how to best protect themselves. In the face of such uncertainty, maladaptive psychological responses, such as somatisation, become more of a concern.

SOMATISATION

People are differentially affected in terms of their ability to cope with the uncertainty involved with RBC events^(11, 12, 22). While some groups will be more resilient, others will need more care in order to cope with an extreme event. A common psychological reaction to trauma or shock is for people to display physical symptoms such as nausea, vomiting or dizziness that do not have a medical explanation⁽³⁾. This phenomenon is described as socio-genic illness or 'multiple unexplained symptoms'. Though the term 'worried well' has also been used to describe this phenomenon, this term has been criticised for dismissing the reality of the symptoms (people do exhibit actual vomiting or skin rash) and the very real psychological trauma these individuals experience⁽²³⁾. At times these multiple unexplained physical symptoms may overlap with the symptoms caused by exposure to an agent, making triage and diagnosis all the more difficult for medical personnel.

Somatic symptoms may also have a ripple effect, in that a person exhibiting physical symptoms induced by stress may incite others to believe that they are also 'exposed' to whatever agent has caused the somatic symptoms in the first individual⁽²⁴⁾. This ripple effect can be quite significant, affecting a large portion of the overall population. For example, in Goiania, Brazil, after a group of children was accidentally exposed to Cesium 137 that had been unintentionally distributed by a junk dealer after the dismantling of an X-ray clinic, the number of people who had actually been exposed to the Cesium was close to 250. However, over 112 000 people showed up at the olympic stadium to be scanned for signs of exposure⁽²⁵⁾. Three years later, it was found that those individuals with anticipatory stress of exposure showed indicators of stress-related concentration deficit at levels that were comparable to those individuals who were actually exposed⁽²⁶⁾.

In terms of stress levels, fear of having been exposed may be just as psychologically damaging as

actually having been exposed. A study conducted in the UK following an anthrax hoax in October 2001 found that individuals who came into contact with packages suspected of containing anthrax had significantly higher stress levels⁽²⁷⁾. This study also suggested that the decontamination process and the contact that these individuals had with firemen in full protective gear may have contributed to these increased levels of anxiety. Psychosocial ripple effects can therefore be seen even in the absence of the impact stage, in events that do not go beyond the threat or warning time phases.

Anxiety and fear of contamination can also lead people who are at low risk or no risk of contamination to request to be screened or tested. Following the intentional poisoning of Alexander Litvinenko in 2006 with polonium-210 (²¹⁰Po), there were individuals who demanded to be tested for contamination, even though they were not at risk⁽²⁸⁾. Similarly, following the Goiania accident, many individuals requested certification that they were not contaminated⁽²⁹⁾. In both cases, these requests were not refused, and in doing so, these vulnerable sub-groups received the reassurance they needed from public officials. Pre-screening such groups using sensitive portal monitors⁽³⁰⁾ may assist in separating those who fear they are contaminated from those who are actually contaminated and provide greater speed and efficiency. Psychosocial guidance should also be on hand to provide the targeted reassurance and advice about coping strategies⁽³¹⁾.

MEDIA ROLE AND COMMUNICATION

In times of uncertainty, the public turns to the media when seeking information about potential threats⁽³²⁾, thus media role becomes instrumental when relaying messages to the public. For example, in the 2 weeks following the anthrax attacks in October 2001, 78 % of Americans in a poll stated that they were following the news 'very closely'⁽³³⁾. In communicating risks to the public, it becomes necessary to provide good quality information to the media in an open and candid manner and to work out a relationship that fosters and feeds the role of the media as protecting public good. Providing the media with access to an abundance of good information will prevent journalists from jumping to conclusions, inflating the facts or accusing government officials of hiding things.

Some individuals may also be more affected than others by the grotesque images of the medical effects of exposure to chemical, biological or radiological materials or the repetition of continuous information coverage⁽³⁴⁾. These images may be lasting, causing some to re-experience the trauma in the form of flashbacks. Exposure to these sorts of images can be particularly damaging in children, solitary viewers,

elder, already anxious or depressed individuals, regardless of whether these images are seen in person or if the graphic images appear in news media. Post-traumatic symptoms have been found in children who have viewed traumatic events on television, regardless of whether or not they were directly or indirectly affected by the event⁽³⁵⁾. New social media and internet exacerbates the effects of virtual and vicarious exposure.

Public perceptions are influenced not only by the degree of exposure to a hazard⁽¹⁰⁾, but also by the content and delivery of risk messages^(36, 37). Social media applications present new methods of delivering messages to the public. By using these new conduits for information dissemination, it becomes possible to reach a larger number of people in a timely manner with preventative and mitigating recommendations. Supplying pro-social images of successful and innovative coping strategies and reminding the media of constructive advice can support them in playing their role of assistance to the public.

INFORMATION SHARING

In the absence of information, rumours flourish⁽²³⁾ and the perception of risk may become amplified in the eyes of the public⁽³⁷⁾. Given the impact of uncertainty upon risk perception, stress and on trust^(12, 37, 38), it is much better to acknowledge what is not known as well as the steps that are being taken to handle a situation than it is for public officials to say nothing at all.

For example, a partial core meltdown of a Three Mile Island nuclear power plant in 1979, led to an unintentional release of radiation, which prompted public officials to recommend a limited evacuation of pregnant women and pre-school children. The lack of information and behavioural guidance provided by officials resulted in the chaotic and unwarranted self-evacuation of much of the area's residents⁽³⁹⁾. Those who evacuated and were not parents of children under the age of 18 demonstrated greater psychological symptoms including a depressed mood, increased worry, loss of faith in experts and less perceived control over their lives than those who had not evacuated⁽⁴⁰⁾.

BEHAVIOURAL GUIDANCE

Positive coping behaviours may be elicited in the public by modifying perceptions using clear and understandable risk messaging. Conversely, a failure to provide clear messages can have detrimental effects on both the physical and the emotional well-being of the general public. In the context of a mass decontamination situation, clear communication is vital in terms of evacuation alerts and shelter in

place procedures. The use of plain language rather than specialised terminology is necessary to improve compliance with official directives. Surveys have shown that the public may not be inclined to follow instructions from authorities if it challenges their urge to be united with their children and close ones, and that community leaders can do little to improve compliance if they do not understand terms such as shelter-in-place⁽⁴¹⁾.

Research also indicates that past behaviour predicts future behaviour⁽⁴²⁾. Everyday routines are predictive of how the public will behave when faced with a RBC threat. Ingrained patterns of behaviour are difficult to shed in emergency situations, where the public has a tendency to revert to routines. These routines may either enhance the safety of individuals (as in the case of emergency drills), or they may exacerbate the harm of exposure to dangerous substances⁽⁴³⁾.

Taking a taxi to hospital is an example of a pattern that is ingrained, so for the victims of a RBC incident, it would be a natural solution to the problem of transportation when ambulances are not available, rather than waiting for ambulances and waiting to be decontaminated. Emergency planners must realise that the public may not follow procedures outlined in a agency plan⁽⁴¹⁾. When managing mass exposure, it is important to recognise and identify routine behaviours during pre-event planning so that these considerations are integrated in plans and anticipated, and that the new recommended behaviours are rehearsed. The public needs to be widely educated about appropriate response and why.

For example, during the Tokyo subway attacks, in which sarin gas was released nearly simultaneously on five different subway cars, the victims self-transported to the emergency rooms. According to St. Luke's Hospital, 35 % of the sarin patients walked to the hospital and 24 % arrived by taxi⁽⁴⁴⁾. As a result, those who drove the exposed individuals experienced secondary exposure, as did some of the medical professionals in the emergency room, as there had not been a chance for decontamination procedures to be followed on scene⁽⁴⁵⁾.

It is also a common misperception that the public will either freeze or panic when face with a disaster situation⁽⁴⁶⁾. The media has a tendency to perpetuate the myth that the public is likely to panic in extreme event⁽³⁾. Research has shown that the public is more likely to behave in purposeful and adaptive ways based on their understanding of the situation, which in turn depends on perception of events. Moreover, threats may even have a positive effect on a community as they stand united in their response. Actually, data show that in most emergencies and disasters bystanders offer help and demonstrate solidarity, compassion and assistance behaviours. On the surface,

some public behaviour may appear to be a result of panic, such as running away from a physical threat, but these sorts of behaviours should be understood as normal, rational and life-preserving reactions to real threats. People aim for purposeful behaviour however misguided it may turn out to be if they do not know better.

For example, the public's purposeful behaviour may lead to undesirable reactions as well. During the anthrax attacks in 2001, there was a spike in the amount of ciprofloxacin prescribed as many individuals sought preventative prophylaxis treatment⁽⁴⁷⁾. Unfortunately, there was also a spike in the sale of ciprofloxacin on-line, which was available without a prescription⁽⁴⁸⁾. Twenty-three websites were created to sell ciprofloxacin in the weeks following the attack, most likely in response to consumer demands stemming from public fears. Such unnecessary use of ciprofloxacin could have led to drug shortages, antibiotic resistance or adverse reactions⁽⁴⁹⁾. Though such actions by the public are certainly problematic, it is important to distinguish this sort of judgement error stemming from a lack of information from irrational decision-making associated with the idea of public panic⁽¹⁶⁾.

Hence, adapted behaviour from the public and compliance with authority guidelines for decontamination depends on public education and appropriate communication of risk pathways and protective measures. All sorts of data support that enhancing sense of self-efficacy, agency, mastery, empowerment of people through skill sets, shared expectations and preparedness training improve behavioural response. Pre-event rehearsal will improve the performance and at a minimum mental imagery, virtual drills, vicarious play, when done in a secure environment, will all help if actual enacting is not possible.

ORGANISATIONAL ISSUES

In times of uncertainty, people will want to help and connect with one another. Ample evidence attests to the fact that the first impact of emergencies is to create a surge for telecommunication networks. People will go to extreme to search and reunite with closed ones, especially towards children. This key psychosocial consideration requires planners and officials to ensure that this sort of pro-social behaviour is encouraged and guided so that people do not further tax the emergency response, nor harm themselves or others.

Keeping families together during an extreme event is therefore an important measure for both actual effectiveness and in limiting further trauma. Efforts must be made to keep families together during screening for contamination⁽⁵⁰⁾. This will both speed up the screening of small children and lessen the

potential for post-traumatic stress disorder both in parents and in children.

This psychosocial consideration of helping and connecting becomes particularly important in instances where quarantine is required. Quarantine, isolation or movement restrictions often restricts an individual's ability to access existing the emotional support systems, including families, schools, faith-based organisations and family physicians⁽⁵¹⁾. Incorporating these natural support systems at the pre-event planning stage will help those under quarantine mitigate some of the negative psychosocial consequences of isolation. These consequences may include fear, boredom, loneliness, anger and worry⁽⁵²⁾. Planning for assistance for basic needs of food and care for both the quarantined individual or the rest of the family is essential⁽⁵³⁾.

For example, one patient quarantined during the outbreak of severe acute respiratory syndrome in 2003 stated⁽⁵⁴⁾ 'Being in quarantine and the need to have to restrict physical contact, to wear a mask, and to remain at home has far-reaching consequences, including the loss of intimacy and social contact, culminating in physical and psychological isolation (54)'. Along with providing telephone and internet access to those under quarantine, social media tools such as Skype, Twitter and Facebook can all be used to maintain connections using informal support networks. Organisational issues therefore arise in the planning for quarantine ripple effect on the families, especially for one's own staff.

Collaboration at the inter-organisational level is also crucial to an effective response to outbreaks, RBC threats and contamination of food or water supplies. For example, threats that have been intentionally released will require coordination between law enforcement agencies and public health agencies⁽⁵⁵⁾. If criminal activity is suspected decontamination process will be impacted and likely delayed. The surge from mass decontamination will require organisations to share resources, personnel or experience⁽³⁴⁾. Moreover, the inevitable relying on community volunteers will in turn demand pre-planning, pre-training and educating about a generic template of emergency assistance and mass decontamination principles.

CONCLUSION

More work needs to be done on the application and integration of the existing research on psychosocial factors into planning and implementation of mass decontamination.

Psychosocial considerations need to be addressed in terms of responders' needs, healthcare and emergency infrastructure, screening processes, risk communication, media management and community engagement. Taking steps to mitigate negative psychosocial effects and to facilitate pro-social

behaviours during the pre-event stage is critical to response.

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