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Facing the possibility of bioterrorism

Bill Durodié

The possibility of bioterrorism has been met by significant financial outlays to map out public health responses. These have included comprehensive audits of potential agents, as well as exploring mechanisms for counteracting their impact. Psychological intervention and communication have been identified as key areas requiring further work, as fear of infection could pose a greater strain on social resources than the pathogens themselves. Bioterrorism provides a powerful metaphor for elite fears of social corrosion from within. Accordingly, a broader historical and cultural perspective is required to understand why individuals and societies feel so vulnerable to what remain largely speculative scenarios.

Addresses

Director, International Centre for Security Analysis, King's College London, 138-142 Strand, London WC2R 2LS, United Kingdom
e-mail: bill.durodie@kcl.ac.uk

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Introduction

In 2002, in the aftermath of anthrax attacks on politicians and the media the previous year that affected 22 people (five fatally) [1], the US government signed legislation providing \$2.9 billion to enhance bioterrorism preparedness, including public health and medical strategies [2]. Unsurprisingly, therefore, there is a vast and burgeoning academic literature on all imaginable aspects of bioterrorism: ranging from the identification of potential agents and how to counteract them, through syndromic surveillance and diagnosis, to consequence management including treatment, isolation, risk communication and psychological intervention [1,3]. Several specialist publications have been launched and numerous conferences held to discuss these issues.

Many experts expressed the hope that, after years of neglect, by capitalizing on political concerns, fear of bioterrorism would allow the field of public health to come of age [4–7]. Health tracking systems designed to deal with terrorist attacks are expected to also be of use in monitoring emerging infectious diseases more broadly and for identifying the roots of chronic illnesses [4]. This

may be true, but it is also an indictment of scientific and political leaders that they only appear willing to develop a sense of common purpose in the aftermath of adversity. What is more, it remains to be determined whether it is as straightforward to reorient systems and staff developed and trained to target specific agents, to having to deal with more general ailments, as it would be the other way round.

During this period, an outbreak of severe acute respiratory syndrome (SARS) developed in South-East Asia and was transported to a few other locations worldwide. Researchers appear to have used this episode to confirm their own prejudices, either warning of a possible apocalypse yet to come or using it as evidence of the need for, or efficiency of, the new health alert mechanisms put into place as a consequence of the focus on bioterrorism [7–9]. A less salutary interpretation of these events might suggest the very opposite — an over-reaction to a minor and predictable condition that, through the prism of the newly inflated sense of risk and warning systems, led to society inflicting considerable, yet unnecessary, damage on several regional economies and airlines.

Bioterrorism is defined as the release of biological agents or toxins that impact upon human beings, animals or plants with the intent to harm or intimidate [10–13]. Those pathogens perceived to be the most threatening, on the basis of infectivity, virulence, lethality, pathogenicity, incubation period, contagiousness and stability, are known by Centres for Disease Control as category A agents [14–16] and are smallpox, anthrax, plague, botulism, tularemia and viral haemorrhagic fevers. Category B agents, which include the toxin ricin, are considered to be less easy to disseminate, have lower morbidity and mortality rates, and are less likely to challenge the public health system. Emerging pathogens are defined as category C agents.

A lot of articles have outlined the properties of the prime suspects, focusing on dose, transmission, diagnosis and treatment. These reviews encompassed numerous journals and books, as many professions are considered to be in the front-line of having to identify or deal with bioterrorism [10,14,15,17]. Few writers, however, point to the difficulties in developing, producing and deploying biological agents [18], as evidenced by the failures of the Japanese cult, Aum Shinrikyo, with biological agents almost a decade ago [11]. In fact, such agents have rarely been used and there is a limited list of such incidents, dating back to the throwing of people infected with bubonic plague over the walls of Kaffa by the Black Sea in the mid-fourteenth century, through the purported

use of smallpox infested blankets by Lord Amherst against native American tribes in the mid-eighteenth century, to a growing number of incidents across the world over the course of the twentieth century [11,12,18].

The effective use of chemical and biological weapons awaited proper scientific understanding and technical capabilities that only emerged from the late nineteenth century onwards. But, it is the advent of biotechnology over the past 50 years, and in particular the more recent, if overstated, possibility of genetically engineering agents to target specific biological systems at the molecular level, that is held to pose a new and significant challenge for the future [19]. Accordingly, there is an increasing amount of literature on the need to reaffirm and strengthen existing counter-proliferation protocols, such as the Biological Weapons Convention, to monitor the use and deployment of so-called dual-use technologies, which can mean almost anything, and to ensure greater scrutiny of scientists and the communication of scientific methodologies and data [11,12,19,20].

Another area presumed to be of concern to the management of such incidents is that of dealing with their psychological impact [3,21,22*,23–25]. Weapons of mass destruction in general, and chemical and biological weapons in particular, are considered to be likely to produce adverse psychosocial consequences upon targeted populations [26], despite a paucity of data in this regard [22*]. Limited, hurried and fairly superficial surveys conducted in the aftermath of the 11 September 2001 attacks purport to show significant levels of post-traumatic stress disorder, affecting both those who were immediately present, as well as those more indirectly exposed through the medium of television [21,23,24,27**]. As a consequence, numerous strategy documents have been, or are being, prepared aimed at ensuring that politicians and emergency responders are aware of, and prepared to deal with, these broader phenomena [28,29]. This article goes on to deconstruct some of the key concepts and assumptions within this debate.

Putting bioterrorism in context

Much of this discussion takes at face-value the notion of an impending threat posed by (usually) external malefactors [19], bent on undermining western democracies, as well as the extreme vulnerability of these societies to such attacks and the assumed fragility of their members [23,24]. There is little attempt to identify possible internal sources of discontent, in view of the fact that the West has greater access to, and capabilities in developing, such weapons [18]. Nor is there any general recognition that advanced economies are better placed to deal with the consequences and contain the potential of bioterrorism, a fact that significantly undermines their purpose to outsiders. More importantly, there is little understanding that our exaggerated sense of vulnerability and frailty

is both historically contingent, predating 9/11 quite significantly, and culturally determining, giving shape to and driving much of the bioterrorism agenda [30**,31*].

A notable exception to this trend is presented by King, a medical historian and epidemiologist, who identifies one of the casualties of these times as being 'a proper sense of history' [30**]. He notes that 'experts were using the threat of novel diseases' as a rationale for change long before the recent attacks, and that contemporary responses draw on 'a repertoire of metaphors, images and values' shaped by even older, more complex forces. He goes on to suggest that 'American concerns about global social change are refracted through the lens of infectious disease', signifying a more broadly perceived 'loss of control' over contemporary society. This important essay, shows that a major contribution to our proper understanding of these purportedly narrowly scientific or military issues will come from some unexpected directions.

Another of these is sociology. In his latest book, Furedi, explores the roots of a growing sense of social and individual vulnerability in what he coins 'therapeutic culture' [32**]. By increasingly framing problems through the prism of their emotions, people are actively incited to feel powerless and ill. Accordingly, 'the spirit of stoicism and sacrifice', along with 'a sense of common purpose, unity or a commitment to fight' are now rarely in evidence. A powerful consequence of this, along with distorted perceptions [33] and an increase in reported rates of depression, is provided by the phenomenon of mass psychogenic (or sociogenic) illness [22*,27**], numerous instances of which became evident in the aftermath of the anthrax attacks [31*,34].

Essentially, psychogenic illness occurs when members of a group exhibit a rapid spread of the signs and symptoms of an illness, but the physical complaints have no corresponding organic aetiology [22*]. In extreme situations such cases can rapidly overwhelm existing healthcare resources, undermining the treatment of those directly affected or contaminated [21]. The arrival of television cameras or emergency workers wearing decontamination suits can act as the confirming trigger for this spread [27**,31*]. So too can psychological interventions, such as debriefing, which also undermine constructive, pro-social and rational responses, including the expression of strong emotions such as anger [35–38].

Thus, it is evident that social and cultural expectations as to behaviour shape professional interventions in an emergency or the aftermath of disaster, and that these are significant determining factors as to outcomes [39*]. Accordingly, political and media presumptions that the public will panic, despite a categorical lack of evidence in this regard, are both false and ultimately debilitating [22*,35,39*,40]. Although trying to be helpful in this

regard, a forthcoming World Health Organisation document displays a confused outlook, arguing for the development of long-term professional psychosocial frameworks of support, but conceding that these cannot be imposed [28]. In an incisive critique Pupavac has exposed the limitations of, and false assumptions lying behind, such interventions [41**].

In their study of Gulf War veterans, Stuart *et al.* [42] report a significant reinforcement of false beliefs in exposure to toxins among veterans receiving primary diagnoses of mental disorder. This points to the fact that psychiatrists can end up becoming complicit in shaping and creating individual and social ills [42–44]. Despite good intentions, it is difficult for the latter not to reflect the broader social outlook that emphasizes vulnerability and human frailty. The extent to which this script is culturally constructed is made evident by Bleich [45*]: an Israeli population habituated to living with terrorist attacks displayed lower reported rates of post-traumatic stress disorder than those observed in the US post 9/11.

All manner of technological fixes for dealing with the presumed problem of bioterrorism, from new vaccines to regulations regarding the conduct and communication of science, are being proposed and examined. But, none of these address our corrosive, culturally determined concerns. Indeed, by suggesting the primacy of objective — scientific problems over subjective, social and political ones — an emphasis on technical responses ensues that tends to push people further apart, thereby encouraging them to be more suspicious of one another [46]. This separation can promote a preponderance of rumours and hoaxes, as well as reinforcing passive notions of susceptibility to apparently inevitable threats [21,26,33,47]. Real resilience requires bringing people together with a sense of common purpose [48*].

In this regard, numerous well-meaning contributions, emanating from several directions including the emergency planning community and risk managers and communicators, suggest the need to provide more or better information as a necessary building-block for restoring public trust and confidence [8,11,21,35,49–51] and uncritically accept the supposed threats and fears. Information is necessary [26], but not sufficient to fundamentally address or assuage concerns; it cannot compensate for the demise of a more confident and purposeful culture. Indeed, if it fails to address the ‘credibility gap’, as Glass puts it [39*], or fulfil the ‘need to find meaning’ referred to by Hassett in his important contribution [27**], then information can readily become part of the problem rather than being a cure.

Conclusions

Many responses to the perceived threat of bioterrorism fail to address the social, cultural and historical context

shaping such concerns [30**,34]. Accordingly, there has been a tendency to seek quick technical fixes to assumed problems, rather than addressing more profound political and perceptual issues. Yet, developed societies had increasingly been living in fear of the consequences of social and technological change well before the recent terrorist attacks, and politicians had busily been reinventing themselves as risk managers accordingly. Ironically, attempts to control or contain change, often for purportedly environmental or moral reasons such as the US ban on stem-cell research, could end up exposing us to even greater risks [35].

As the public are the real first responders in any emergency or disaster, it is vital that they be fully integrated into, and engaged by, a set of broader social aims and values [48*]. The confidence derived from having a sense of purpose or mission, developed over a long-term, active, political engagement in society, cannot be short-circuited by technical means or information campaigns. Hence, although specialist simulations and exercises for dealing with bioterrorism incidents may be of benefit to emergency responders and political leaders [13,16,52,53], they are unlikely to achieve any broader resilience across society. Worse, by failing to address the cultural presumptions and concerns that underlie the emergence of such issues, they may serve to truly corrode society from within. Restoring an appropriate and robust sense of confidence to deal with these matters will need to be a political, not a technical, project.

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References and recommended reading

Papers of particular interest, published within the annual period of review, have been highlighted as:

- of special interest
 - of outstanding interest
1. Beale AJ: **Bioterrorism: what can we do?** *J R Soc Med* 2002, **95**:479-480.
 2. Noji E: **Medical preparedness and response to terrorism with biological and chemical agents: present status in USA.** *Int J Disaster Med* 2003, **1**:51-55.
 3. Levy BS, Sidel VW (eds): *Terrorism and Public Health: a Balanced Approach to Strengthening Systems and Protecting People.* New York: Oxford University Press; 2003.
 4. Marmagas SW, King LR, Chuk MG: **Public health's response to a changed world: September 11, biological terrorism, and the development of an environmental health tracking network.** *Am J Public Health* 2003, **93**:1226-1230.
 5. Ashraf H: **Europe's response to bioterrorism starts slowly but gathers pace.** *Lancet* 2002, **360**:733-734.
 6. Hayward M: **Management issues surrounding the United Kingdom health services' ability to deal effectively with major incidents involving bioterrorism.** *J Nurs Manag* 2003, **11**:197-207.
 7. Drexler M: **Interview with David L Heymann, MD, representative for polio eradication and former Executive Director,**

- Communicable Diseases, World Health Organization.** *Biosecurity Bioterrorism* 2003, **1**:233-237.
8. M'Ikanatha NM, Lautenbach E, Kunselman AR, Julian KG, Southwell BG, Allswede M, Rankin JT, Aber RC: **Sources of bioterrorism information among emergency physicians during the 2001 anthrax outbreak.** *Biosecurity Bioterrorism* 2003, **1**:259-265.
 9. Lowe TJ: **Anticipating the worst is a good thing: SARS reinforces need for comprehensive emergency preparedness.** *Am J Nurs* 2003, **103**:120.
 10. Sawyer PP: **Bioterrorism: are we prepared?** *Home Health Nurs* 2003, **21**:220-223.
 11. Venkatesh S, Memish ZA: **Bioterrorism — a new challenge for public health.** *Int J Antimicrob Agents* 2003, **21**:200-206.
 12. Morse SS: **Biological and chemical terrorism.** *Tech Soc* 2003, **25**:557-563.
 13. WHO: **Health aspects of chemical and biological weapons.** Geneva: World Health Organization; 2002. URL: http://www.who.int/emc/pdfs/BIOWEAPONS_FULL_TEXT2.pdf
 14. O'Brien K, Higdon ML, Halverson JJ: **Recognition and management of bioterrorism infections.** *Am Fam Physician* 2003, **67**:1927-1934.
 15. Han SZ, Alfano MC, Psoter WJ, Rekow ED: **Bioterrorism and catastrophe response: a quick reference guide to resources.** *J Am Dent Assoc* 2003, **134**:745-752.
 16. McCarthy M: **USA moves quickly to push biodefence research.** *Lancet* 2002, **360**:732.
 17. Roy MJ: **Physician's guide to terrorist attack.** Totowa, New Jersey: Humana Press; 2003.
 18. Beeching NJ, Dance DAB, Miller ARO, Spencer RC: **Biological warfare and bioterrorism.** *BMJ* 2002, **324**:336-339.
 19. Petro JB, Plasse TR, McNulty JA: **Biotechnology: impact on biological warfare and biodefense.** *Biosecurity Bioterrorism* 2003, **1**:161-168.
 20. Secretary of State for Foreign and Commonwealth Affairs: **Strengthening the biological and toxin weapons convention: countering the threat from biological weapons.** London: Cm 5484; 2002. URL: <http://www.fco.gov.uk/Files/kfile/btwc290402.pdf>
 21. Hall MJ, Norwood AE, Ursano RJ, Fullerton CS: **The psychological impacts of bioterrorism.** *Biosecurity Bioterrorism* 2003, **1**:139-144.
 22. Alexander DA, Klein S: **Biochemical terrorism: too awful to contemplate, too serious to ignore.** *Br J Psychiatry* 2003, **183**:491-497.
- Comprehensive literature survey and review including an overview of mass psychogenic illness.
23. Schlenger WE, Caddell JM, Ebert L, Jordan BK, Rourke KM, Wilson D, Thalji L, Dennis JM, Fairbank JA, Kulka RA: **Psychological reactions to terrorist attacks: findings from the national study of Americans' reactions to September 11.** *J Am Med Assoc* 2002, **288**:581-588.
 24. Lamberg L: **In the wake of tragedy: studies track psychological response to mass violence.** *J Am Med Assoc* 2003, **290**:587-589.
 25. Stein BD, Tanielian TL, Vaiana ME, Rhodes HJ, Burnham MA: **The role of schools in meeting community needs during bioterrorism.** *Biosecurity Bioterror* 2003, **1**:273-281.
 26. Saathoff G, Everly GS Jr: **Psychological challenges of bioterror: containing contagion.** *Int J Emergency Mental Health* 2002, **4**:245-252.
 27. Hassett AL, Sigal LH: **Unforeseen consequences of terrorism: medically unexplained symptoms in a time of fear.** *Arch Intern Med* 2002, **162**:1809-1813.
- Excellent overview of psychiatric problems arising from the lack of definition given to threats and social isolation. Clear understanding of the primacy of social factors.
28. WHO: **Mental health of populations exposed to biological and chemical weapons.** Geneva: World Health Organization; 2004. URL: http://www.who.int/mental_health/prevention/mnh_and_cbw_prepub_version.pdf
 29. North Atlantic Treaty Organisation: **NATO-Russia advanced research workshop on social and psychological consequences of chemical, biological and radiological terrorism.** Brussels; 2002. URL: <http://www.nato.int/science-old/e/020325-arw2.htm>
 30. King NB: **The influence of anxiety: September 11, bioterrorism, and American public health.** *J Hist Med* 2003, **58**:433-441.
- Outstanding analysis from a social and historical viewpoint. Points to the need for more cultural interpretations of supposedly scientific problems.
31. Hyams KC, Murphy FM, Wessely S: **Responding to chemical, biological or nuclear terrorism: the indirect and long-term health effects may present the greatest challenge.** *J Health Polit Policy Law* 2002, **27**:273-290.
- Prescient overview of the main issues providing a clear exposition and numerous examples of the problem of somatic symptoms.
32. Furedi F: **Therapy Culture: Cultivating Vulnerability in an Uncertain Age.** London and New York: Routledge; 2004.
- Excellent introduction to the way in which a therapeutic ethos now imbues most institutions in contemporary society and the impact this has on our views and aspirations.
33. Halpern-Felsher BL, Millstein SG: **The effects of terrorism on teens' perceptions of dying: the new world is riskier than ever.** *J Adolesc Health* 2002, **30**:308-311.
 34. Durodié B: **Perception and threat: why vulnerability-led responses will fail.** *Security Monitor* 2002, **1**:16-18.
 35. Perry RW, Kindell MK: **Understanding citizen response to disasters with implications for terrorism.** *J Contingencies Crisis Man* 2003, **11**:49-60.
 36. Wessely S, Deahl M: **Psychological debriefing is a waste of time.** *Br J Psychiatry* 2003, **183**:12-14.
 37. van Emmerik AAP, Kamphuis JH, Hulsbosch AM, Emmelkamp PMG: **Single session debriefing after psychological trauma: a meta-analysis.** *Lancet* 2002, **360**:766-771.
 38. Lerner JS, Gonzalez RM, Small DA, Fischhoff B: **Effects of fear and anger on perceived risks of terrorism: a national field experiment.** *Psychol Sci* 2002, **14**:144-150.
 39. Glass TA, Schoch-Spana M: **Bioterrorism and the people: how to vaccinate a city against panic.** *Clin Infect Dis* 2002, **34**:217-223.
- Powerful illustration of the impact emergency managers have on determining social behaviour and outcomes. Argues forcefully for the need to engage the public well in advance of disaster.
40. Durodié B, Wessely S: **Resilience or panic? The public and terrorist attack.** *Lancet* 2003, **360**:1901-1902.
 41. Pupavac V: **Pathologizing populations and colonizing minds: international psychosocial programs in Kosovo.** *Alternatives* 2002, **27**:489-511.
- Incisive critique of psychosocial interventions in conflict regions and the developing world, suggesting these to be based upon false assumptions and to produce adverse outcomes.
42. Stuart JA, Ursano RJ, Fullerton CS, Norwood AE, Murray K: **Belief in exposure to terrorist agents: reported exposure to nerve or mustard gas by Gulf War veterans.** *J Nerv Ment Dis* 2003, **191**:431-436.
 43. Mahan CM, Kang HK, Dalager NA, Heller JM: **Anthrax vaccination and self-reported symptoms, functional status, and medical conditions in the national health survey of Gulf War era veterans and their families.** *Ann Epidemiol* 2003, **13**:1-8.
 44. Mason BW, Lyons RA: **Acute psychological effects of suspected bioterrorism.** *J Epidemiol Community Health* 2003, **57**:353-354.
 45. Bleich A, Gelkopf M, Solomon Z: **Exposure to terrorism, stress-related mental health symptoms, and coping behaviors among a nationally representative sample in Israel.** *J Am Med Assoc* 2003, **290**:612-620.

Excellent empirical analysis of trauma suffered by Israeli residents through terrorism. Concludes the impact to have been remarkably moderate considering the degree of exposure.

46. Durodié B: **Is real resilience attainable?** *Security Monitor* 2003, **6**:15-19.
47. Dworkin MS, Ma X, Golash RG: **Fear of bioterrorism and implications for public health preparedness.** *Emerg Infect Dis* 2003, **9**:503-505.
48. Durodié B: **Sociological aspects of risk and resilience**
 - **in response to acts of terrorism.** *World Def Syst* 2004, **7**:214-216.Overview of historical and social factors affecting cultural resilience. Suggests our response to terrorism invariably teaches us more about us than about the terrorists.
49. Blendon RJ, Desroches CM, Benson JM, Herrmann MJ, Taylor-Clark K, Weldon KJ: **The public and the smallpox threat.** *N Engl J Med* 2003, **348**:426-432.
50. Fischhoff B: **Assessing and communicating the risks of terrorism.** In *Science and Technology in a Vulnerable World*. Edited by Teich A, Nelson D, Lita S. Washington: American Association for the Advancement of Science; 2002:51-64.
51. Fischhoff B, Gonzalez RM, Small DA, Lerner JS: **Evaluating the success of terror risk communications.** *Biosecurity Bioterrorism* 2003, **1**:255-258.
52. Jarrett D: **Lessons learned: the 'pale horse' bioterrorism response exercise.** *Disaster Manag Response* 2003, **1**:114-118.
53. Mitka M: **Bioterror exercise tests agencies' mettle.** *J Am Med Assoc* 2003, **289**:2927-2928.