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How to Reduce the Impact of "Low-Risk Patients" Following a Bioterrorist Incident: Lessons from SARS, Anthrax, and Pneumonic Plague

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A bioterrorist attack may result in a large number of people who have not been exposed coming to medical facilities in search of treatment or reassurance. In this article, we review evidence from 3 previous biological incidents that are analogous to a bioterrorist attack in order to gauge the likely incidence of such "low-risk patients" and to identify possible strategies for coping with this phenomenon. Evidence from the anthrax attacks in the United States suggested that a surge of low-risk patients is by no means inevitable. Data from the SARS outbreak illustrated that if hospitals are seen as sources of contagion, many patients with non-bioterrorism-related healthcare needs may delay seeking help. Finally, the events surrounding the pneumonic plague outbreak of 1994 in Surat, India, highlighted the need for the public to be kept adequately informed about an incident. Although it is impossible to say what the likely incidence of low-risk patients will be during a future bioterrorist incident, several strategies may help to reduce it and to safeguard the well-being of the low-risk patients themselves. These strategies include providing clear information about who should and should not attend hospital; using telephone services to provide more detailed information and initial screening; employing rapid triage at hospital entrances, based, where possible, on exposure history and objective signs of illness; and following up by telephone those judged to be at low risk.

Bioterrorism has the potential to place great strain on a region's medical services. While patients requiring emergency care may represent a substantial caseload, a greater issue may be the accompanying influx of people who have not been exposed but who wish to be assessed, decontaminated, and treated. Many of these patients may report physical symptoms that can be hard to differentiate from the symptoms of exposure to a bioterrorist agent, but which have their origin in psychological mechanisms or are the result of other conditions that are unrelated to the attack.[1,2] Other patients may attend hospital with acute psychological distress, due to exacerbation of a psychiatric disorder, or because they wish to obtain more information about the incident.

Finding an appropriate term for this heterogeneous group is difficult. The phrase "worried well," which is sometimes used, is now seen as disparaging, inaccurate, and unhelpful and should no longer be applied. A better term may be "low-risk patient."[3] Identifying which individual patients are genuinely at low risk may present difficulties in some incidents, particularly those where exposure status is difficult to confirm, but for other incidents the term is easier to apply. The phrase also allows for a degree of uncertainty about risk status and has reassuring connotations for the patient.

The arrival of large numbers of low-risk patients at hospitals following a bioterrorism incident would be problematic

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for 3 main reasons.[3-5] First, it would complicate the situation at hospitals receiving exposed patients, potentially delaying the treatment of the acutely ill, creating difficulties of crowd control, and tying up medical resources. Second, for the low-risk patients themselves, attending hospital following a bioterrorist attack might increase their risk of exposure to the agent in question, as well as their risk of misdiagnoses and inappropriate treatment. Third, the needs of low-risk patients may be poorly attended to at hospitals that are already overstretched dealing with medical casualties. Although not direct victims of the attack per se, many low-risk patients nonetheless have genuine healthcare needs and require suitable reassurance. If inappropriately handled, the potential exists for the physical symptoms and distress experienced by some of these patients to become chronic problems.[2]

Although concern exists about the likelihood of a surge of low-risk patients affecting hospitals and other healthcare resources following bioterrorism, little is known about the characteristics of such a phenomenon or the possible interventions that might ameliorate it. In this article, we review the incidence and impact of low-risk patients in 3 previous infectious disease incidents: the anthrax attacks in the U.S. during 2001, the outbreak of severe acute respiratory syndrome (SARS) in 2002 and 2003, and the outbreak of pneumonic plague in Surat, India, in 1994. These outbreaks were chosen because they represent a genuine bioterrorist attack (anthrax);[6] a natural outbreak of a potential bioterrorism agent, which at the time was widely rumored to be a deliberate release (pneumonic plague);[7] and a major outbreak of a novel emerging pathogen that required some hospitals to activate their bioterrorism protocols in order to cope with the incident (SARS).[8] Data relating to these incidents are used to characterize likely low-risk patient behaviors and to suggest possible strategies for dealing with them.

Methods

A search of Medline allowed us to identify publications that might contain relevant data (search strategy available on request). For the anthrax and SARS outbreaks, papers expressing only expert opinion or anecdotal evidence were excluded. However, given the paucity of relevant data for the pneumonic plague outbreak in Surat, such evidence was included where relevant for this incident.

Results

Anthrax

Impact on attendance at hospitals and other healthcare facilities

We identified 1 study that provided quantitative data on changing patterns of hospital usage during the time period of the U.S. anthrax attacks.[9] According to this retrospective analysis for 15 New Jersey emergency departments, all within a 55-mile radius of one of the anthrax incidents, an increase in the number of patients whose notes indicated that they were "screened for infectious disease" but who had "no diagnosis of feared complaint" occurred immediately after the first local anthrax case was identified.[9] In absolute terms, however, this increase represented only 0.92% of all emergency department visits during that period, although for the 2 hospitals closest to the affected postal facility, this figure doubled to 1.8%.[9] A second study, concerning a large primary care facility in New York, also noted a rise in patient visits following the attacks compared with either the previous or subsequent years.[10] However, out of all 30,456 contacts with patients that were recorded by the practice between September 11 and December 21, 2001, only 244 involved any patient-initiated discussion about bioterrorism (0.8%). Of the 241 individual patients involved, 97 reported potential exposure (either to a white powder or because of working in a mail room) and 110 reported subjective symptoms; 21% requested antibiotics.[10]

Surveys of the general public confirmed that there was a relatively low level of healthcare use among low-risk individuals as a direct result of the anthrax attacks. In one survey only 5% reported that they or anyone else in their household had spoken to a doctor about health issues relating to bioterrorism, while only 3% reported that they or someone else from the household had spoken to a health professional about their anxieties relating to the attacks.[11] These data do hide a degree of variability, however: within areas involved in an incident, individuals who reported that they, a close friend, or a family member had been caught up in the anthrax events were more likely to have spoken to a physician about anthrax-related concerns or anxiety, or to have obtained a prescription for antibiotics.[11]

Demand for antibiotics

Evidence was found that some low-risk U.S. citizens requested, and received, prescriptions for ciprofloxacin and doxycycline (the 2 antibiotics recommended as primary prophylactic agents against anthrax). One assessment of prescriptions given out by pharmacies across the U.S. noted large increases in the distribution of both drugs in October 2001 compared to October 2000, despite relative stability in prescriptions for other antibiotics, with prescribing of the 2 drugs increasing by roughly 160,000 and 96,000 courses, respectively.[12] This does not imply that these drugs were actually consumed, however; stockpiling by concerned members of the public may also explain the increase. For instance, general public surveys found that while 4% reported that they or someone else in the household had obtained a prescription for antibiotics, less than 0.5% had actually taken the medication.[11] This increased prescribing of antibiotics to low-risk patients was also identified by others, using both prescribing trend data and surveys of physicians.[10,13,14]

Impact on other healthcare resources

During the attacks, telephone hotlines were set up to deal with calls from the public or from healthcare professionals. These came under some pressure. One location received 25,000 such calls during a 2-week period, while 9 other states recorded 2,817 calls during the course of a week.[6] During 1 month, the CDC Emergency Operations Center logged 11,063 anthrax-related calls, of which only 882 were referred to a second-tier state liaison team.[15] Although most of these calls related to low-risk patients, only 20% actually came from members of the public, with most coming from healthcare workers and state or federal employees. Thus, the hotline does not seem to have been used primarily by people seeking reassurance for symptoms unrelated to exposure. Instead, the commonest reason for calling related to requests for general bioterrorism information.[15] As well as phoning call centers, U.S. citizens also turned to the internet during the attacks to obtain more information,[11] with use of the CDC website increasing by 100%.[16]

Severe Acute Respiratory Syndrome (SARS)

Overall impact on healthcare resources

One key feature of the SARS outbreak was the high number of hospital-acquired infections that occurred; of 8,096 cases, 1,706 (21%) occurred in healthcare workers.[17] This had a major impact on the number of patients attending hospital for any reason during the outbreak. Using a retrospective review of charts in one Taiwanese hospital assigned to accept SARS patients, Huang et al reported a 44% reduction in adult patients attending the emergency department during the peak of the outbreak.[18] This reduction occurred primarily in patients with a less urgent need to be seen; no change was found in the number of patients arriving by ambulance with a critical or life-threatening illness or requiring admission to a ward or to intensive care. Many other hospitals reported similar declines in non-SARS-related visits,[19-24] while data from Taiwan's National Health Insurance program showed significant declines in expenditure for both ambulatory and inpatient care during the period of the outbreak.[25] Further analysis of insurance data showed that reductions were particularly evident for respiratory diseases, minor problems, and elective surgery and less so for acute conditions, mental disorders, or essential treatment that could not be postponed.[26]

Why did hospitals witness such reductions in patient numbers? The periodic closure of services, public appeals for patients with minor illnesses to stay away, and concern among some members of the public about possible detention if they were found to be febrile may all have contributed.[19,21,23,27] But given that declines in hospital attendance also tended to be linked to media reporting of SARS cases, that an increase in patients discharging themselves from hospital against medical advice was observed, and that the general public endorsed staying away from hospitals as a useful way of avoiding SARS, it seems probable that fear of acquiring SARS was a key reason for the reductions.[21,24,28]

Importantly, though, while nonessential use of hospitals declined, this does not mean that patients no longer sought help for non-SARS-related conditions. Instead, a shift in the way that help was sought was identified in several studies. For example, in Toronto, both Telehealth Ontario (a 24-hour medical advice line) and primary care physicians reported a large increase in the number of consultations being given by phone.[23] Meanwhile, analysis of health insurance data suggested that, for certain conditions, smaller district hospitals and clinics (which were less willing or able to take SARS patients) witnessed an increase in patient numbers.[26,29]

Use of healthcare resources by low-risk patients

Although the most striking finding from the SARS outbreak was the overall fall in patient attendance at hospitals, of those who did attend many were low-risk patients. For instance, Boutis et al cited unpublished data from 2 Toronto hospitals:[23] One hospital reported screening "more than 1000 concerned members of the public, 70 of whom met the case definition of suspected or probable SARS."[23(p1354)] The other hospital reported that "up to 50% of presenting patients had concerns that their symptoms were SARS-related."[23(p1354)]

More rigorous data were available from Singapore, where the main hospital responsible for treating SARS assessed 11,461 patients in a triage center set up outside the main emergency department entrance.[8] This process involved checking for the presence of fever and administering a simple questionnaire to assess exposure history and symptoms. Of all patients screened in this way, only 1,386 (12%) were subsequently admitted to the hospital for further assessment.[8] Of the remaining 10,075, it was subsequently found that 28 did have probable or suspected SARS and had been misclassified. The remainder (88%) were categorized as low risk, with the authors noting that "the majority were either asymptomatic or had minor ailments such as upper respiratory tract infection."[8(p13)] These patients were provided with education about SARS, reassurance, and telephone follow-up over the next 2 weeks.

This experience was also mirrored in a Taiwanese hospital that received requests for screening from 1,421 "individuals who had no documented fever or exposure history."[30(p94)] These 1,421 low-risk patients, many of whom reported various medically unexplained symptoms, accounted for 64% of all potential SARS patients who were seen.[30]

In addition to coming to the hospital, low-risk patients also used other resources. In Taiwan, a dedicated SARS fever hotline was set up with the specific intention of

triaging patients with fever and reducing the number of low-risk patients attending hospital.[31] A separate telephone number for individuals seeking general information rather than medical advice was also provided. In an 11-day period, the fever hotline received 11,228 calls. Of these, 28% were advised to seek medical assistance, 21% were advised to remain at home and monitor their symptoms, and the majority (51%) received general advice but did not require any specific medical recommendations. Of callers for whom data were available, only 37% actually had a fever.

Meanwhile, in Hong Kong 5% of the public in one survey reported getting health information about SARS from medical professionals.[28] This contrasts with 19% of Toronto residents and 6% of U.S. residents.[32]

Pneumonic Plague

On September 19, 1994, 3 patients with pneumonic plague were admitted to the New Civil Hospital in the Indian city of Surat, triggering a major public health response. In total, the incident eventually resulted in 56 deaths[33] and caused enormous public fear and a large-scale spontaneous surge of people away from the city. This was partly the result of ill-informed, inconsistent, or incomplete information being given out during the crisis.[34]

Perhaps the most notable low-risk patient behavior observed across India during this outbreak was the widespread purchasing of those medicines that were reported in the media to act as a prophylaxis against plague, including tetracycline and a homeopathic preparation called phosphorus 30.[7,35-37] This "panic buying" placed pressure on stocks of these medications.[34,35,38] In addition, it was widely recognized at the time that many patients arriving at hospital for assessment did not have plague.[39]

This problem stemmed partly from poor case definitions and limited triage arrangements. As news reports noted, "[T]he standard response [from physicians around India] has been to admit patients with 'plague-like symptoms' to hospital" with doctors "referring many patients with high fever, cough and chest pain to the hospitals reserved for cases of plague."[39(p897)]

Unfortunately, this loose definition also encompassed tuberculosis, pneumonia, and malaria.[39] In addition to misdiagnosis, self-referring low-risk patients also contributed to the problem, with hospitals in Dehli becoming "flooded" with anxious patients,[34] while the New Civil Hospital was reported as being "packed with plague and the worried well."[40] As one expert later observed, "[A] little runny nose and a cough, you were immediately rushed to the hospital."[34(p29)] This phenomenon may go some way toward explaining the puzzled comments that some experts made regarding the outbreak: "Almost all the patients had mild illness. High fever was uncommon, and a significant number had no fever at all. The look of the affected persons failed to reveal that they were having a serious disease."[35(p188)]

Discussion

Estimates of the potential incidence of low-risk patients following a future bioterrorist attack can vary widely.[5] In truth, however, it is impossible to give any firm estimate: while some previous examples have resulted in a large number of low-risk patients seeking access to healthcare services, other examples such as the anthrax attacks have resulted in less health anxiety among the unexposed public. Several factors help to explain why the incidence can differ so dramatically.

First, the perceived risk associated with the incident is clearly crucial, with factors that increase the dread or outrage felt by the public (eg, in Surat) or the perceived likelihood of being affected by the incident serving to moderate the likelihood of individuals using healthcare resources. With regard to this latter point, the geographical or occupational restriction of any risk and also whether a disease is perceived to be contagious or not are clearly key factors to consider (eg, anthrax).

Second, a population's perceptions about the nature of the agent involved and whether healthcare services can offer effective protection or treatment will also be important. This is true regardless of the validity of these perceptions: in Surat, for instance, the widespread purchasing of tetracycline and phosphorus 30 was triggered by media reporting of their prophylactic powers, not by the objective efficacy of either drug.[34]

Third, the perceived risk-benefit trade-off involved in attending healthcare facilities will also determine how many low-risk patients use them. Where hospitals are viewed as potential sources of contagion, as in the SARS epidemic, this will restrict the attendance of low-risk patients.

Fourth, the availability of alternative resources that meet the needs of low-risk patients will also be important. This can range from trusted organizations providing credible information about when to seek help, to resources specifically allocated to assessing, advising, and reassuring low-risk patients on a one-to-one basis.[15,31]

Finally, even the definition of "low-risk patient" will differ across incidents, depending on the specific nature of the threat. For example, an overt release of infectious material that is identified early may differ from a covert release that goes undetected for some time in terms of how authorities must define "high-risk," and hence "low-risk," patients. In some circumstances, any patient reporting flulike symptoms may need to be considered at risk, even if this will inevitably include some patients whose symptoms are attributable to other causes.

Strategies for Reducing the Impact of Low-Risk Patients

Our review suggests several strategies that may help to reduce the impact of low-risk patients following bioterrorism. These largely concur with previous recommendations.[3-5] In the

immediate aftermath of an attack, providing information as quickly as possible about who should seek medical attention, and who should not, will be essential.[3] Clear, consistent messages of this type helped keep patient numbers to manageable levels during the SARS outbreak.[19,23] In order to reduce attendance at hospitals by patients with symptoms that are not attributable to the incident, such information should ideally specify objective criteria such as exposure or fever as the criteria for seeking help. Depending on the incident, however, this may not always be possible. Continually updated, credible information concerning the incident in general should also be provided. In previous incidents, a substantial motivation for low-risk patients to interact with the health services has been their desire to obtain more information.[10,11,15,31] The use of a continually updated internet resource is one route that may help to provide this level of detailed information to concerned members of the public, while reducing the pressure on medical services.

Inevitably, however, some people will still wish to discuss their concerns with a clinician. If local regulations allow it, then facilities to provide remote, one-to-one advice and assessment away from hospitals must therefore also be in place, with telephone consultations remaining the most pragmatic way of providing this. Experience from the SARS and anthrax incidents suggests that telephone help lines providing general information and preliminary medical assessments were used by members of the public who might otherwise have presented at hospitals or primary care facilities.[15,31]

Regardless of what preventive steps are taken, some low-risk patients will nonetheless present at hospital or primary care practices. Rapid triage of patients, based wherever possible on exposure history or objective clinical signs, will therefore be required to identify those requiring immediate treatment. While some authors have suggested that "low-risk patient facilities" or "support centers" be used to house patients turned away from triage points, thus providing a venue in which to give out information and conduct further assessment,[3-5] in the context of an infectious disease outbreak in which there is a risk of person-to-person transmission, a better approach may be to ask patients to return home following triage and after the provision of information and reassurance, with the promise that further follow-up by telephone will occur.[8] This would help to reduce the risk of contagion, allow a patient's psychological state to be assessed over a lengthier period of time, reassure patients that they have not been forgotten, and provide a secondary stage of triage, allowing patients who were initially miscategorized to be identified and recalled to hospital.[8]

Reductions in the Use of Medical Services during an Incident

While unnecessary use of healthcare resources by low-risk patients is of concern, our review also suggested that consideration be given to patients who require medical help for conditions unrelated to an attack but who will either delay seeking help or change the way in which they get healthcare services through fear of coming into contact with the bioterrorist threat. This is particularly likely to be the case for infectious diseases with high rates of person-to-person transmission. This phenomenon, observed most clearly in the SARS outbreak, can result in dramatic declines in patient numbers at major hospitals, together with increased use of smaller facilities and telephone consultations.[23] While explicitly demonstrating to patients that hospitals remain safe to visit may help to reduce this effect, planners should be aware that telephone-based healthcare resources and smaller healthcare facilities may require additional resources to cope with increased demand following a bioterrorism incident.

Conclusions

Our review highlighted several key lessons that could be learned from the SARS, anthrax, and pneumonic plague incidents and that may help in preparing for the challenges presented by low-risk patients following a future terrorist attack. In particular, we have noted several features of an incident that may have a large impact on the nature and magnitude of changes in behavior in the unexposed population, we have highlighted the need to plan for decreased use of hospitals following a major incident, and we have suggested the need for adequate telephone facilities to allow low-risk patients to obtain information, early triage, and subsequent follow-up, as required.

We would, however, also raise an important caveat. The scientific literature on low-risk patient behavior following major incidents is sparse, particularly with regard to good quality data concerning the incidence, motivations, or outcomes of low-risk patients, or the efficacy of different strategies for reducing their impact on the healthcare services and for ensuring that their own well-being is looked after.[3] Many of the suggestions in this article are thus speculative. A need exists for more research into each of these issues, beginning with a prospective cohort study of all patients who present at healthcare facilities following the next major chemical, biological, or radiological incident.

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