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Adversaria

In this issue of *Longwoods Review* we focus on an issue that many countries and jurisdictions are grappling with right now – creating strategies for preparing for biological/chemical terrorism or infectious diseases such as SARS or Avian Flu. Nash and Ramsay from the University of Ottawa present an intriguing idea for maximizing resources while also controlling public health risk through the introduction (or re-introduction) of house calls. The authors argue that the current system of patients coming to clinics, emergency rooms or doctors' offices is not in the best interests of public health when dealing with an epidemic. Rather they suggest it would be far more effective to assess, diagnose and treat patients in their own homes. Of course, feasibility is an issue in this scenario. The authors present a compelling case for how and why this idea could work.

Waters and Justus from the University of North Carolina at Chapel Hill respond by offering observations from the United States where similar strategies have been developed to decentralize the delivery of emergency services. They endorse the strategy of containment suggested by Nash and Ramsay and further suggest several factors that need to be carefully considered – early and effective communication to the public; surveillance and monitoring systems that can identify the hazards from the outset; and, in the case of chemical or biological terrorism, systems for decontaminating affected patients prior to care. Water and Justus suggest that adapting Nash and Ramsay's concept of bringing care to those in need might be achieved through larger gatherings of isolated patients.

We thank both teams of authors for providing a thought-provoking yet highly practical discussion on what may well be one of major challenges to our health-care systems in the coming years.

Peggy Leatt, PhD



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Viewpoint: Health Visitors and Public Health and Security

John C. Nash and Tim Ramsay

Abstract

Post-“911” discussion about preparing, as a society, for biological and chemical terrorism or infectious diseases like SARS suggests similarities in potential public health impacts of such threats. As a hypothesis for focusing debate, we propose that a system of healthcare including house calls might be a good strategy for reducing the impact of both biological/chemical terrorism and highly infectious diseases. We present some ideas and very simplified calculations to argue that a different approach to preliminary assessment, triage and treatment is feasible, and could reduce risks to public health and security by reducing the movement of people who may spread infection or toxins while threats are assessed.

MOTIVATIONS

Over the last 30–50 years, the practice of house calls by physicians or other healthcare workers has mostly disappeared. Increasingly, patients who believe they are unwell present at physicians’ offices, walk-in clinics or

hospital emergency wards. This leads to a problem in the case of an infectious disease outbreak or of a terrorism incident involving a toxic agent that can be transported on an infected individual’s clothing or person. In such a case, it is not in the best public interest that affected individuals mingle with others in public places, especially doctors’ offices, clinics and hospitals where healthcare workers may be implicated. On the other hand, to minimize the spread of the illness it is imperative that patients be assessed and diagnosed rapidly and receive prompt medical attention. In the case of terrorism involving a toxic agent, rapid environmental cleanup is also required.

Over the same period, that is, post-World War II, the number of deaths due to infectious diseases in the developed world has become very small. The Australian Bureau of Statistics (2002), in particular, prefaces its report “Australian Social Trends 1997 – Health - Mortality & Morbidity: Infectious Diseases” with the sub-headline “Between 1921 and 1995, death rates

from infectious diseases fell from 185 to 6 per 100,000 population.” We believe that, due to this remarkable decline, we have very little mental preparedness for dealing with an old-fashioned epidemic involving a disease with high morbidity. Even though significant numbers of people die each year of influenza, they are generally already frail (US Centers for Disease Control 1995).

There are many reasons to expect that this happy absence of infectious diseases and accidental or deliberate large-scale injury will not continue. A search of *The Lancet* (2004-4-26 at 22:55) found 9,159 hits using the keywords “drug resistant infection.” SARS has re-emerged in Beijing, a large-scale cull of poultry has been undertaken in British Columbia (see also *The Lancet* 2004) and anti-mosquito measures have been applied in an attempt to control West Nile infection in various parts of North America (Sharp 2003).

New pathogens emerge over time (http://www.globalhealth.org/view_top.php3?id=229; Weissenböck et al.

2002) and deaths due to infectious diseases appear to be increasing (Pinner et al. 1996; Pindera 2004).

We believe it to be self-evident that the use of health visits (house calls) by workers trained in infection and toxin control as the first-contact of patients with the healthcare infrastructure would go a long way to reducing the risks posed above. The more important question is whether it is feasible and reasonable, and the rest of our viewpoint article considers this issue.

ELEMENTS OF A SOLUTION

To provide prompt diagnosis and care while minimizing social contacts of infected patients, it would be ideal if the medical care could come to the patient. Implementation would require a group of healthcare workers who are well-trained in infection control, triage, testing and sample-gathering. Such a group of workers could provide initial care, decide which patients may safely go to a public facility, and gather samples to screen for known or unknown pathogens.

The gathering and analysis of patient samples, a particularly important element in dealing with infectious outbreaks and biological/chemical terrorism, at the moment generally takes place on a per-patient basis, which is both too expensive and too slow to adequately cope with a situation requiring extensive testing of a relatively large population. We propose an alternative based on some fundamental changes.

First, the collection of these samples could be greatly enhanced by making effective use of modern communication technology to manage the process. Internet and telephone connectivity are common enough that patient screening could be organized remotely. Already programs such as the Ontario Telehealth initiative (*London Free Press* 2003; Jennett et al. 2004) are beginning to use connectivity as a tool for provid-

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ing healthcare advice. Combining communications and well-constructed Web-based information systems with appropriate teams of mobile health visitors supported, managed and advised by physicians, public-health specialists and technical workers could facilitate more efficient and more reliable identification of emerging risks. Even better would be the use of sensors such as thermometers, imaging devices or other measurement technology connected to the communications tools.

Second, we believe that many patients, using telecommunications support, could collect their own samples and/or measurements for screening purposes if appropriate kits were developed, standardized and provided as items that should be in every medicine cabinet.

Third, the testing process itself could be streamlined by carefully pooling multiple samples to screen for particular pathogens, especially rare or novel ones. This could be used to eliminate large groups of subjects from further investigation along particular directions, while permitting a return to individual samples whenever necessary. Moreover, it seems likely that an infrastructure favouring mobile workers needing rapid answers for tests would encourage the development of inexpensive and portable tools for the purpose, including ways to split and pool samples efficiently.

OBSTACLES TO A HOUSE-CALLS MODEL

The primary obstacle to implementing any new service delivery system is posed by the mass of investment, struc-

ture and habit built into any existing system. We do not propose to address “management of change” issues here, in part because it will be a factor in whatever new systems are implemented. Rather, we consider whether a new system of the type described will be markedly different in costs from the existing system. This ignores the catastrophic cost of a failure of an “office/hospital” system that is compromised by infectious disease or by terrorist attack.

Two financial obstacles to people both seeking medical advice and staying home when they are sick are co-payment fees and wage loss. To control health insurance costs, either public or private, there have been many suggestions that patients should contribute to the fees for physician consultations by co-payments, of which but one example is the scheme introduced recently in Germany (*Deutsche Welle* 2003; Orellana 2004). Co-payments are intended to be a disincentive to seeing a physician and may result in individuals electing not to seek medical help when, in fact, they should. A second disincentive is the income loss incurred when a person is unable to work. This was arguably the most difficult obstacle to “voluntary” quarantine in the Toronto SARS outbreak (*London Free Press* 2003). Appropriate minimization of these obstacles would add to the costs of any “house-calls” system, but should increase its effectiveness in containing an outbreak of an infectious disease or the impact of an attack by toxic or infectious substances. Effective quarantine is, of course, required for any system that is established.

PRACTICALITIES

We believe that the task of implementing a “house-calls” system need be no more complex or costly than many other public health ventures. While the administrative overhead involved in managing and supervising the body of house-call workers would undoubtedly be substantial, current structures already involve a small army of support staff to operate. Presently laboratory tests identify pathogens in an individual. By contrast, the main benefits of testing for dangerous pathogens accrue to the members of society who do NOT get infected. In jurisdictions where the patient pays part of the laboratory costs, they are subsidizing the public good. The same issue, of course, is a

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difficulty for immunization schemes, where even if there are no charges, those participating take the risk of side effects while those who do not get the benefit of the herd effect. Even where tests are publicly funded, we believe individualized tests to be inefficient.

Under our proposal, physicians and other healthcare workers would have somewhat different daily work patterns than in the present “doctor’s office” approach. The mechanisms by which remuneration is organized may also need to be different from the current

schedule of fees approach. However, we already have models for this in public health and in emergency care, of which our proposal may be considered an outreach. Indeed, there are parallels with the air-rescue system used by the American military in Vietnam (Nathens et al. 2004), where physicians at central locations advised helicopter-borne paramedical staff. In part, this system was used because physicians were considered too valuable to put in harm’s way, but also because there were not enough of them to staff all the medevac helicopters.

In a simplified calculation using a range of the annual number of events per patient from 0.25 to 10, a range of patients per day per worker from 5 to 40, a cost per worker (including all overhead) of \$75,000 to \$250,000, and based on 200 working days per year, the annual cost of workers per person in the population in this system varies from \$2.50 to \$2,500. Even though the true cost is likely to be closer to the higher end of this range, this is not dissimilar to sums already being spent. In other contexts, studies have found that house calls can be cost-effective (Barclay 2003).

CONCLUSION

Our numbers and our examples are not meant for planning. Rather, they are intended to argue that an infectious-disease/toxic-substance-attack management system of the style described is within the bounds of possibility, especially if there is an active effort to enhance its efficiency with good management and technical support. It would, of course, change many aspects of healthcare outside the scope of infection or toxins, and overlap into non-public health aspects of the healthcare infrastructure. Our contention is that initiatives like those presented above deserve vigorous discussion and debate, despite the political reluctance or even antipathy

in many nations toward “free” healthcare services. In our new climate of drug-resistant disease, together with the threat of bioterrorism, the alternative may turn out to be a “free” death for many of our nation’s citizens.

We welcome comment and hope that our ideas will encourage further investigation of novel approaches to the challenge of first-line medical care.

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COMMENTARY

Health Visitors and Public Health: A U.S. Perspective

J. Bennet Waters and Steven G. Justus

CONCEPT

Nash and Ramsay present a compelling case for reconsidering methods by which healthcare assets are deployed to reduce the impact of chemical/biological terrorism and highly infectious disease. We concur with the authors' general thesis regarding the need to decentralize the delivery of emergency healthcare services, particularly following an event of the magnitude they describe. The necessity of identifying creative ways to respond to increasingly complex situations of national significance has never been as important as it is at present.

Nash and Ramsay are to be congratulated for their willingness to engage others in thoughtful discussion. We write here in response to the authors' proposal; offer our observations on similar strategies currently employed in the United States; and suggest an area in which the authors' concepts might be adapted.

PARALLELS IN UNITED STATES PUBLIC HEALTH

Central to Nash and Ramsay's proposal is the ability for non-physician healthcare personnel to make rapid, accurate triage and assessment decisions. A parallel recent proposal in the US would increase the scope of practice for many pre-hospital emergency care providers. However, Schmidt and colleagues (2000) determined that despite protocols to assist emergency medical technicians (EMTs) in making

pre-hospital determinations regarding the need for transportation to a hospital, "from 3% to 11% of patients determined on scene not to need an ambulance had a critical event." A similar study concluded that "paramedics using written guidelines fall short of an acceptable level of triage accuracy to determine disposition of patients in the field" (Pointer et al. 2001). Such findings suggest that there needs to be more rigorous review of pre-hospital providers' capabilities for making the types of determinations proposed by Nash and Ramsay. In the United States, there is ongoing research to identify effective strategies by which healthcare assets might be more effectively deployed following a wide-scale disaster. We also suggest that there be similar studies to evaluate the abilities of other allied health providers (e.g., nurses, physicians' assistants, etc.) to make more accurate triage decisions.

The American public health system has enjoyed success with previous efforts to decentralize certain services. For example, public health agencies have recently begun offering "drive-thru flu vaccination clinics" in order to increase the participation in immunization of at-risk citizenry. Under such programs, patients literally "drive through" a portable tent staffed by public health nurses, and participants are immunized without ever getting out of their cars. Similar programs have been used for cholesterol screening, free blood pressure measurement

and many other wellness/preventative services. Success with such decentralized programs bodes well for further applications consistent with Nash and Ramsay's model.

OTHER CONSIDERATIONS

Nash and Ramsay raise important issues regarding the limitations to their proposal. We agree that the logistics of quarantine will be important drivers in the efficacy of any decentralized approach to delivering disaster medicine. In addition, however, we are concerned that the strategies they offer for the various decentralization scenarios may need additional refinement for several important reasons.

First, there is the phenomenon of the "worried well." According to Beaton et al. (2005), in the hours and days following the Aum Shirinkyo's release of sarin gas in the Tokyo subway system, the vast majority of patients self-triaged themselves directly to local emergency departments. Moreover, the "worried well" – who were psychologically but not *physiologically* affected by the sarin – outnumbered true patients by a ratio of 4:1 (Beaton et al. 2005: 108). The impact of these physically well patients on individual facilities overwhelmed hospitals' surge capacity.

Citing Auf der Heide's 1996 findings, Beaton et al. (2005) note that self-triage to healthcare facilities begins almost immediately after a disaster event, "with most of the casualties arriving at nearby hospitals on their

own, in non-emergency vehicles within an hour and a half of the disaster impact” (105). Even though we readily agree with Nash and Ramsay that it is far more effective to treat only those who require medical attention (and, ideally, to treat them in the least expensive setting), early and effective public information and communication will be critical components of keeping patients – both real and the “worried well” – from self-triaging to hospitals; if the communication of this information is not available in a timely fashion, it will undercut any strategy to treat patients in their homes.

Second, surveillance systems currently employed to isolate and identify widespread epidemiological outbreaks are not yet sophisticated enough to immediately detect and identify many of the biological agents that would likely affect a populace. Infection with many weaponized biological agents will likely present as generalized flu-like symptoms. By the time large numbers of patients are identified (e.g., by monitoring admissions to hospital emergency departments, absenteeism from school or work or visits to private physician offices), the spread may well be such that it will be impossible to control mass self-triage such as that described by Auf der Heide and Beaton et al. (1996). Nevertheless, continuous efforts to improve surveillance and monitoring are critical, and it will be difficult to base a “care-in-place” strategy on these systems until they are more effective.

Third, incidents involving chemical and biological terrorism will require decontamination of affected patients prior to their receiving definitive medical care. The equipment required for thorough decontamination is both expensive and complicated. We have some concern that implementing individualized decontamination may prove more challenging than the authors assume.

POTENTIAL ADAPTATION

Despite our concerns, we recognize that Nash and Ramsay have proposed a concept that has numerous possibilities for adaptation. One such adaptation might build on the concept of “sheltering-in-place,” which has been discussed at length in the disaster management literature. (See, for example, Sorenson et al. 2004.) According to the “shelter-in-place” practice, instead of evacuating citizens to a remote location, those affected by a disaster are provided with food, water, shelter and other required provisions on-site, while disaster recovery occurs around them. In these cases, health-care professionals and medical assets are frequently deployed directly to the sheltered locations, in effect executing Nash and Ramsay’s concept of bringing healthcare to those in need. The difference is that the deployed assets are brought to locations containing large numbers of patients in need instead of going house to house to see patients in individual settings. We feel that adapting Nash and Ramsay’s concept to larger gatherings of *isolated* (versus “quarantined”) patients would reflect a modification of current practices by which “sick call clinics” are set up near large shelters for evacuated patients.

CONCLUSION

Nash and Ramsay provide thought-provoking strategies to decentralize the response to large-scale medical disasters. An all-hazards approach to disaster management requires careful coordination of medical assets that is capable of delivering effective health-care to affected individuals. The authors are quite correct in their observation that highly contagious or biologically contaminated patients could pose a clear danger to entire regions of the world. Even though we see some operational challenges to implementing a house-to-house approach, we feel Nash and Ramsay have correctly framed the need

to bring healthcare to patients during major adverse events. We hope that more strategies that might accomplish this objective, maximizing centralized medical expertise and logistical convenience without sacrificing the ability to leverage economies of scale, can be identified. We encourage additional thoughts for developing and implementing adaptations to their proposal.

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