SOME PUBLIC HEALTH PERSPECTIVES ON QUANTITATIVE RISK ASSESSMENTS FOR BIOTERRORISM

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1. Background

In the context of bioterrorism and public health infrastructure public health professionals have a number of particular and crucial roles. These run in parallel with those in a wide range of other operational and strategic disciplines, such as those related to:

- More general national and international threat assessments
- The maintenance of local, national and international resilience
- The empowerment of emergency and essential services

Public health roles include assisting with the:

- Identification of potential threats (horizon scanning and surveillance)
- Formulation of policy
- Undertaking of planning
- Implementation of new, or the augmentation of existing, response capabilities

Under these headings potentially come:

- Improvements in diagnostics (detectors)
- The stockpiling of countermeasures, such as drugs and equipment
- The identification of existing and/or development of new systems for immediate response, and subsequent primary and secondary care (e.g., hospitals/treatment/decontamination centres),
- The clear delineation of lines of communication and data flows
- The training of responders

The public health process also involves assisting with:

- Raising and maintaining general awareness
- Testing and reviewing plans through desk-based and field exercises, and through these exercises
- Updating planning and policy

Many of these public health-related activities would also be common to preparedness for more natural emerging infectious disease threats, such as those posed by severe acute respiratory syndrome (SARS) and pandemic influenza.

2. Different “Motivations” for Risk Assessment and Modeling

For the threats posed by both bioterrorism and “exotic” emerging infectious diseases the data and solid contemporary evidence-base on which to develop preparedness are usually limited or lacking. Further, and especially for communicable diseases, the emergent disease dynamics are also often likely to be nonlinear and frequently far from obvious because of the complexities and feedbacks in the disease and public health control mechanisms (Ferguson et al., 2003). Models that accurately capture what evidence is available (often from historical data, laboratory experiments, etc.), therefore, often provide indispensable tools to investigate “what if” scenarios, examine alternatives control options, and develop policy and planning. A key benefit of using models to examine disease control options is their ability to explain and, with appropriate caveats and sensitivity analysis, predict trends at a population level from interactions and processes at the individual level. Models, however, have to be appropriately designed for the questions being addressed (Ferguson et al., 2003).

Often, there are also useful distinctions that need to be made between the types of modeling that might be appropriate for more general threat-assessment exercises and those that might be required from a public health perspective. This can provide some interesting communication challenges. For example, the potential impacts of deliberate releases on public health and public health systems can be orders of magnitude greater than the impacts that might be identified by a more general threat assessment that is based on the more immediate or final effects, such as the likely numbers of directly attributable deaths. This is true of noncommunicable agents and even more so for communicable agents.