



Evidence and Effectiveness in Decisionmaking for Quarantine

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When public health decisionmakers turned to quarantine during the recent severe acute respiratory syndrome (SARS) epidemic, difficult questions were raised about the legitimacy and acceptability of restrictive measures to attain public health goals. SARS also brought to light how scientific uncertainty can permeate public health decisionmaking, leading us to think about the relationship between the adequacy of evidence of the effectiveness of an intervention and its role in the justification of public health action.

In this article, we critically examine the role of evidence and effectiveness in decisionmaking for quarantine. It is our contention that the effectiveness of a public health intervention should not be defined exclusively in (absolute and objective) scientific terms but rather conceptualized relationally and normatively in public health decisionmaking. (*Am J Public Health*. 2007;97:S44–S48. doi:10.2105/AJPH.2005.077305)

IN THE AFTERMATH OF SEVERE

acute respiratory syndrome (SARS) and with an influenza pandemic on the horizon, the use of restrictive measures, such as quarantine and isolation, by public health authorities is back on the agenda of policymakers, ethicists, and health care providers in a way that has not been seen since the turn of the century.

Then, systems of quarantine were quasi-institutions commonly erected at seaports as a means to control the infiltration of infectious diseases into local communities. Long before the notion of public health was formulated, both as a discipline and an institution, and even longer before the emphasis of security and protection embodied in the historic conception of the welfare state entered our political consciousness, the use of quarantine was a fundamental pillar of what were essentially public health measures. It is, thus, both one of the oldest tools of and a precedent to public health that in bygone years was viewed as a legitimate response to protect the public health and commercial interests. For nearly half a century, however, when it appeared that infectious diseases were no longer a threat, quarantine became an antiquated intervention that was hardly ever considered an option, much less invoked on a large scale.

The society in which quarantine was invoked during SARS is fundamentally different than the world in which it was first conceived and enforced. Then, individuals had an obligation to respect restrictive measures. Today, they have the right not to. With the emergence of HIV/AIDS in the early 1980s, there was a renewed interest in quarantine that spurred an intense and often passionate debate about the use of

restrictive measures for communicable disease control in a liberal democratic society. But not long after the notion was (re)introduced, there was an almost unanimous consensus by advocates, practitioners, and scholars alike, that “the revival of [this] archaic doctrine”^{1(p53)} was not, nor would ever be, a justifiable intervention for victims or carriers of HIV/AIDS. So when public health decisionmakers implemented a system of quarantine during the recent SARS epidemic, it raised difficult legal, political, ethical, moral, and philosophical questions about the legitimacy and acceptability of restrictive measures to attain public health goals.

The SARS epidemic also brought to light how scientific uncertainty can permeate public health decisionmaking, leading us to think about how to conceptualize the relationship between the adequacy of evidence of the effectiveness of an intervention and its role in the justification of public health action. Our objective then, is to critically examine the role of evidence and effectiveness in public health decisionmaking with respect to quarantine. It is our contention that the effectiveness of a public health intervention should not be defined exclusively in (absolute and objective) scientific terms but rather conceptualized relationally and normatively in public health decisionmaking.

In the following section, we will give a brief overview of the SARS outbreak and the circumstances that lead to the implementation of quarantine. In the “Ethical Frameworks” section, we will look at how public health ethics frameworks inform an ethical analysis of quarantine, with a focus on the claim that the effectiveness of an intervention ought to be a guiding principle in public health decisionmaking. Following from a recent analysis of effectiveness by Richard Ashcroft, we will explore in the final section the role of effectiveness in public health decisionmaking and challenge the dominant understanding of what effectiveness is in support of our view that public health decisionmaking is both normative and intersubjective.

CASE DESCRIPTION

When SARS emerged in February 2003, it quickly became clear that this was a new infectious disease “of international concern.”^{2(p14)} Although it is believed that the disease first emerged in southern China, it was first documented in Vietnam and later found to have spread mainly to Singapore, Taiwan, and Canada. (The spread of the disease on an international scale is astounding: “by March 12, 55 cases of SARS were recognized, mainly in hospitals in Hong Kong, Singapore and Hanoi. A month later, there were more



than 3000 cases and 100 deaths in 20 countries worldwide. By May 8, 7000 cases, and by June 11, almost 8500 cases and more than 800 deaths, had been reported to the WHO from 29 countries.^{3(p274)}

At the time that it was determined that it was infectious, little was known about SARS. It was within this context of inadequate evidence and incomplete knowledge that public health authorities deemed it appropriate to invoke the precautionary principle—a principle that seeks to implement preventive measures to respond to (real or perceived) risks in the face of uncertainty^{4,5}—and turned to quarantine as a means to interrupt the spread of the disease. Every jurisdiction affected by SARS concluded that “the only possible measures against this outbreak were the centuries-old control measures used in epidemics before the age of antibiotics—isolation, contact-tracing and follow-up, quarantine, and travel restrictions.”^{3(p217)} As such, quarantine and isolation—indeed, one of the oldest tools of public health—were invoked on a scale unprecedented in several decades. (The terms *quarantine* and *isolation* are often used interchangeably although they actually point to different interventions. Quarantine is the isolation of persons with an infectious disease. Historically, quarantine referred to a 40-day period during which ships entering a port where infectious disease was prevalent were detained. Gostin provides succinct definitions of the 2 terms that show their

different meanings. The modern definition of quarantine is “the restriction of activities of healthy persons who have been exposed to a communicable disease, during its period of communicability, to prevent transmission during the incubation period if infection should occur.” In contrast, he continues, “isolation is the separation, for the period of communicability, of known infected persons in such places and under such conditions as to prevent or limit the transmission of the infectious agent.”^{6(p210)}

Perhaps the greatest challenge facing health care providers and public health decisionmakers at the onset of the SARS outbreak was that decisions on how to contain the spread of the disease had to be made against the backdrop of scientific and epidemiological uncertainty. Further exacerbating the uncertain nature of this new and seemingly virulent disease, most jurisdictions invoked quarantine, all the while debating whether it would prove to be an effective intervention. Upshur recounts such concerns, noting that “despite controversies over quarantine, there is no clear or agreed-on sense of what constitutes an effective quarantine.”⁷ Thus, invoking quarantine raised difficult questions about the justifiability of an intervention that may or may not be effective. In spite of this, public health authorities felt justified in invoking quarantine because it seemed, at the time, that it would be the only way to contain the spread of a disease of which very little was known.

But does quarantine not require cogent and legitimate justificatory power in view of the fact that it always represents a significant deprivation of liberty? (Gostin notes that isolation represents “the most serious form of deprivation of liberty that can be used against a competent and unwilling person”; it is not “complicated to decide whom to isolate, where to do so, or for how long.”^{8(p26)} The authors of the SARS study conducted for the US Centers for Disease Control and Prevention echoed this point, noting that isolation is “relatively straightforward scientifically, politically and socially [because] it makes sense to confine individuals who are ill with a communicable disease and limit their contacts.”^{9(p25)} On what grounds, therefore, can public health authorities justify their decision to implement quarantine in spite of the absence of evidence of its effectiveness or the lack of consensus of what constitutes an effective quarantine? We will turn to recent scholarship on public health ethics to begin exploring this question.

ETHICAL FRAMEWORKS IN PUBLIC HEALTH

The impetus to articulate an ethics for public health was the recognition that it presents distinct ethical considerations given its focus on population health (in contrast to clinical and research ethics’ focus on individuals). An ethical framework for public health could also provide public health

authorities with a common vocabulary for the analysis of decisions that come into conflict with the principle of respect for autonomy that is now ascendant in health care.

Upshur¹⁰ proposes a public health ethics framework that identifies 4 principles—the harm principle, proportionality, reciprocity, and least restrictive measures—to guide public health intervention. In an article on the ethics of quarantine, he shows how the application of these 4 principles can provide the justification for the implementation of an autonomy-limiting strategy, such as quarantine.⁷ Other public health scholars, such as Childress et al,¹¹ Callahan and Jennings,¹² Kass,¹³ and Roberts and Reich,¹⁴ have also contributed frameworks of analysis that give priority to distinct ethical considerations in public health. In doing so, they identify dilemmas that range “from maximizing utility to preventing harm to distributing benefits fairly [to] identifying program goals, determining effectiveness, minimizing burdens, proportionality, and procedural justice.”^{15(p236)} What is significant for the purpose of our analysis, however, is that these frameworks, almost unanimously, point to the importance of justifying public health intervention on the basis of its effectiveness. Kass succinctly summarizes this view: “Programs that are coercive,” she argues, “should be implemented only in the face of clear public health need and good data demonstrating effectiveness.”^{16(p1780)}



ETHICS AND QUARANTINE

In a similar vein, Barbera et al¹⁷ examine the role of quarantine in the context of potential bioterrorist attacks to argue that large-scale quarantine should not be considered “a primary public health strategy in most imaginable circumstances,”^{17(p2711)} because its effectiveness is questionable. Here they mean that there is no empirical evidence supporting the effectiveness of large-scale quarantine. That is, decisionmakers must consider whether the implementation of large-scale quarantine has a “reasonable scientific chance of substantially diminishing the spread of the disease,”^{18(p2714)} with the caveat that there is no valid (public health or scientific) justification to order quarantine in an outbreak where there is low or no person-to-person transmission of the disease.

So although they allow that public health authorities ought to be able to consider the use of quarantine for other diseases and, thus, presumably, choose to invoke quarantine if it is deemed appropriate, they submit that authorities ought to seek or define “alternatives” to quarantine that “may have more scientific credibility” and that “may be more effective and more feasible.”¹⁷ Moreover, their conclusion that “with modern, in-depth understanding of specific diseases, [a] more specific and medically valid response [than quarantine] is appropriate than that used in the era of poor scientific understanding that established the practice of quarantine” suggests that quarantine is invalid as a modern

public health intervention to achieve public health goals and is rendered irrelevant in the light of scientific advances.¹⁷ Based on our interpretation of the article by Barbera et al,¹⁷ we can, therefore, conclude that they argue that if there is no definitive evidence of the effectiveness of an intervention, then it is neither feasible nor justifiable.

In this logic, effectiveness of an intervention such as quarantine is a necessary condition for public health authorities to justifiably implement and enforce it. However, is it ever feasible to use restrictive measures if and when there is a lack of evidence of its effectiveness? Without definitive evidence, as was the case during the SARS experience, could public health authorities legitimately respond to an infectious disease outbreak in the logic of Barbera et al.¹⁴?

EVIDENCE AND EFFECTIVENESS IN DECISIONMAKING

The uncertainty surrounding SARS created an epidemic of fear that spread with the disease and a sense of urgency to “discover” the “hard facts” about SARS. We expected medical and epidemiological experts to provide evidence-based truths about the disease and develop sophisticated measurements and risk calculations to resolve any, and all, uncertainty.¹⁹ This is because it has perhaps become a given that the facts we gather to guide us in making decisions are grounded in the assumption that science determines the production of

legitimate knowledge—the evidence—that directs the course and outcome of policy and decision processes and that scientific and technical experts are the only legitimate producers of knowledge.

This model of evidence-based decisionmaking is now ascendant in public health decisionmaking.^{20,21} The linkage of evidence of effectiveness of an intervention to the justification for implementing it seems straightforward, almost a matter of common sense. For public health to restrict liberties, observes Callahan, it must provide “solidly based factual evidence,”^{22(p21)} in other words, provide objective, scientific, hard facts to validate decisions that override autonomous decisionmaking. Indeed, the preference for scientifically measured evidence as a means to guide policy and interventions in public health underlies the logic of public health’s basic science, epidemiology, which seeks to gather relevant contributors to disease, breaking these into quantifiable variables to map out the probabilities of risk. As Lupton argues, referring to Gifford’s argument, the epidemiological conceptualization of risk “describes[s] relationships, which are objective, depersonalized, quantitative, and reduces the causality of disease to a single factor or combination of discrete factors whose effects may be traced in a cause–effect relationship similar to the biomedical model.”^{23(p84)} Risk is conveyed in statistical and abstract terms to render “propositions about

general truths”^{24(p132)}—truths, it is believed, that resolve uncertainties.

Yet, this conceptualization of evidence purports that epidemiological propositions are externally validated, paradoxically, outside of the social processes in which they occur. Findings about risk are regarded as objective statistical probabilities, as though it were, or could be, “a measured property.”^{25(p85)} Yet this obscures the contextual and (inter)subjective dimensions of public health science. Indeed, in epidemiological research, few question or even recognize the subjective nature of risk calculations; for example: How is risk defined? Whose judgement is to be considered in evaluating the acceptability of risk? Who should be involved in decisions about controlling risk? What constitutes adequate evidence used to measure risk?¹⁹

All of these questions point to the reality that evidence produced by epidemiological research, including clinical trials, cannot be divorced from the specific context from which they emerge—a context that is, we contend, inevitably historically limited. As Upshur²⁶ outlines, medical evidence has 7 essential characteristics that underpin the contingent nature of evidence. Viewed this way, conclusions about effective treatments or interventions can, thus, only ever be provisional. That is, something is believed to be true until there is better evidence available that will eventually lead to new truths.

Under these conditions, the following questions emerge:



What constitutes sufficient proof to update beliefs in light of new evidence? Or, as Ashcroft puts it, “when should we regard a . . . proposition as proven?”^{27(p132)} How do we establish that something is indeed effective, or ineffective, or no longer effective? In what sense are clinical and policy decisions about the effectiveness of a treatment or an intervention objective? These questions lie at the heart of public health decisionmaking yet remain largely unconsidered in both theory and practice.

CONCEPTUALIZING EFFECTIVENESS

In his article, “What Is Clinical Effectiveness?”^{28(p219–233)} Ashcroft paves a path for us to consider these questions about public health. He addresses the question of how effectiveness is established by challenging the notion that it is an objective assessment—that it is just an intrinsic property, “a physical property in its own right,”^{29(p224)} attributed to treatments (or interventions or outcomes). He argues that effectiveness cannot be established meaningfully on the basis of objective measurements of the physical properties of treatments, but rather, it is established on the basis of what he calls “a family of properties” that include physical (intrinsic) properties and relational (intersubjective) properties. For something to be effective, it has to be a function of something else; in other words, it only makes sense in relation to that against which it is measured, analyzed, and compared, whether it

is against objective end points, patient preferences, or societal or cultural commitments to constituent communities. In the sphere of clinical medicine, and by extension of public health, what is deemed to be effective is inextricably tied to, and largely the product of, understandings of ideas, interpretations of (community and patient) preferences, and cultural commitments. Effectiveness is, as Ashcroft²⁸ puts it, “effectiveness for some purpose,” and, therefore, the multiple and complex considerations that accompany definitions of or conclusions about effectiveness are necessarily bound to claims of effectiveness and are often used to justify such claims.

Because public health action involves multiple communities, it seems reasonable to suggest that claims of effectiveness must necessarily seek and engage multiple perspectives. This would entail, or perhaps require, a reconceptualization or broadening of effectiveness that both recognizes and incorporates its relational and normative properties. That is, having evidence of the effectiveness of an intervention derived from a study, no matter how compelling it may be, neither resolves uncertainty nor sets a necessary course of action.^{27,30} It certainly does not exhaust the concept of effectiveness.

By definition, then, effectiveness entails much more than empirical and scientific considerations but rather involves disparate perspectives that reflect the broader intellectual, institutional, and social context in which public health policies and

interventions are made. Because, at the center of public health practice, are persons and practices, woven within the context of ideas and institutions that are the product of a complex social reality that is situated, historical, and intersubjective. It follows then that arguments about effectiveness cannot rest on what is simply one chosen perspective among many other legitimate interests and views.

Viewed this way, the evidence used in policy and decision processes is no longer understood exclusively as a scientific pursuit driven to measure effectiveness (or probabilities or risk) but is constitutively provisional and intersubjective and, therefore, can function normatively in decisionmaking only when it is inclusive in its definitions and consultative in its process. Evidence-based decisionmaking, although it can be extremely useful, is insufficient. Although it should be used to reflect on what constitutes a reasonable and well-justified decision, it cannot be understood or used as an outcome of decisionmaking rendered as an objective and absolute assessment of all relevant considerations. It ought to be understood and used as a process of reasoned or deliberated justification, one that takes into account a diversity of perspectives.

If the logic of our account of effectiveness is correct, then assessing effectiveness on either a priori grounds or by virtue of empirical evidence alone is insufficient. The decision whether quarantine is or can be effective depends as much on evidence

from epidemiological studies as it does on explicitly identifying and addressing the preferences and cultural commitments of the affected and involved communities. It follows, then, that public health ought to engage our communities and prompt a dialogue on how best to confront communicable disease, as well as which restrictive measures are acceptable to our communities.

Further, by establishing that effectiveness has intersubjective dimensions, we necessarily need to reconceive the fact–value epistemological gap inherent in public health policymaking: fact, which relies on scientific reasoning; value, on normative ethical analysis (that is, to make decisions founded on particular conceptions of what is good, right, and effective). This way, public health decisions actually “carry with them varying levels of empirical certainty,”^{31(p173)} often blurring the line between the fact–value distinction. The “effectiveness” of an intervention, therefore, cannot be the central criteria justifying interventions, if only because the dominant scientific and empirical notion of effectiveness in both theory and practice does not satisfy a claim to proof.

CONCLUSIONS

The decision to implement a system of quarantine cannot be justified or grounded in the notion of effectiveness simply determined in scientific terms. Uncertainty is never fully resolved, and as such, evidence-based decisionmaking ought to be used to



reflect on what constitutes a reasonable and well-justified decision—not because it was scientifically measured or objectively assessed but because it can serve as a process of reasoned or deliberated justification, a process that would serve us well in making public health decisions and justifying the use of restrictive measures during public health emergencies.

The tendency to impart a fixed set of prescriptions and to reduce complex situations to technical problems resolvable by scientific expertise can be compelling in the face of so much uncertainty. Yet, in a democratic society, expertise cannot legitimately be limited and left to scientific experts. By validating other legitimate interests and perspectives in public health decisionmaking, we are simply acknowledging what is already a reality in how decisions are made, especially as they relate to quarantine. It is, therefore, incumbent on us to recognize and legitimize a broader notion of effectiveness—one that transcends the dominant conception that it derives from a set of proven and verifiable data to one that gives a voice to nonscientific, nontechnical perspectives, experiences, preferences, and cultural commitments. Such efforts are essential and not accidental. ■

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Contributors

Ross Upshur originated the study (Ethical Challenges in the Preparedness and Response for SARS: An Interdisciplinary Research Study) from which this article originated. Cécile Bensimon led the writing of the article. Both authors conceptualized ideas and reviewed drafts of the article.

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