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Public health communication with frontline clinicians during the first wave of the 2009 influenza pandemic

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Abstract

Context—During public health emergencies, office-based frontline clinicians are critical partners in the detection, treatment, and control of disease. Communication between public health authorities and frontline clinicians is critical, yet public health agencies, medical societies, and healthcare delivery organizations have all called for improvements.

Objectives—Describe communication processes between public health and frontline clinicians during the first wave of the 2009 novel influenza A (H1N1) pandemic; assess clinicians' use of and knowledge about public health guidance; and assess clinicians' perceptions and preferences about communication during a public health emergency.

Design and Methods—During the first wave of the pandemic, we performed a process analysis and surveyed 509 office-based primary care providers in Utah.

Setting and Participants—Public health and healthcare leaders from major agencies involved in emergency response in Utah and office-based primary care providers located throughout Utah.

Main Outcome Measure(s)—Communication process and information flow, distribution of emails, proportion of clinicians that accessed key websites at least weekly, clinicians' knowledge about recent guidance and perception about email load, primary information sources, and qualitative findings from clinician feedback.

Results—The process analysis revealed redundant activities and messaging. The 141 survey respondents (28%) received information from a variety of sources: 68% received information from state public health; almost 100% received information from healthcare organizations. Only 1/3 visited a state public health or institutional website frequently enough (at least weekly) to obtain updated guidance. Clinicians were knowledgeable about guidance that did not change during the first wave; however, correct knowledge was lower after guidance changed. Clinicians felt overwhelmed by email volume, preferred a single institutional email for clinical guidance, and suggested new information be concise and clearly identified.

Conclusion—Communication between public health, healthcare organizations, and clinicians was redundant, overwhelming, and can be enhanced considering clinician preferences and institutional communication channels.

MESH terms

interdisciplinary communication; disease outbreaks; influenza; public health practice

Introduction

During public health emergencies, frontline clinicians are critical partners in the detection, treatment, and control of disease.(1–7) Public health authorities rely on clinicians to make appropriate decisions about whom to test, how to collect specimens, what treatments to use, and to implement or support public health reporting when it is required by state law for disease surveillance. Similarly, clinicians refer to public health for guidance to control the spread of the disease and the latest intelligence concerning the pathogen. Communication between public health authorities and clinicians is particularly critical when the pathogen has the potential for rapid spread, there is widespread public concern, and the epidemiology and optimal management are unclear, particularly concerning those at risk for severe disease. These factors were present in April, May and June 2009 during the first wave of the 2009 novel influenza A (H1N1) pandemic in the US.(6,8,9)

Background

Communication between public health authorities and frontline clinicians is a critical component of any public health emergency response plan. For the past ten years, public health agencies, medical societies, and healthcare delivery organizations have all called for improvements (1–5,10,11). Even so, we found only three limited evaluations of communication during the recent pandemic in the medical literature (5,12,13) and no literature that objectively assessed communication between public health authorities and frontline clinicians during a public health emergency.

Communication between public health authorities and clinicians is complex. Multiple barriers must be overcome to support an appropriate emergency public health response. In particular, clinicians must be able to identify the authoritative and appropriate source for clinical guidance among the variety of messages available from federal, state and local public health authorities, professional organizations, and their own institutions.(7,14–17) The variety of messages may lead to mixed messages and overload; moreover, their impact is unknown.

In April and May 2009, as the novel influenza A (H1N1) outbreak began in the US, challenges with producing and delivering guidance became evident in Utah and elsewhere. (5,18–20) There was a rapid increase in new information targeting clinicians, particularly concerning personal protective equipment (PPE), high-risk patient groups, diagnostic testing, anti-viral therapies, and immunization. We hypothesized that clinicians would face challenges in keeping up with evolving and tailored messages from multiple organizations at a time when clinic volumes, patient concerns, and media exposure were increasing. We targeted our investigation towards office-based primary care providers for two major reasons: first, information flow may differ in the hospital setting; and second, office-based care is the most frequent usual source of care for individuals in the US(21). In fact, according to the 2008 Utah Healthcare Access Survey, of 88.33% of Utahns who report that they have a usual place that they go when they are sick or need advice about their health, 79.5% report that they go to a private clinic or doctor's office.(22)

The objectives of our investigation were to (1) describe the communication processes between the CDC, state/local public health agencies, healthcare organizations and institutions, and office-based primary care clinicians during the first wave of the novel influenza A (H1N1) pandemic; (2) assess clinicians' knowledge about public health guidance concerning the detection, treatment, prevention, and control of novel influenza A

(H1N1) virus, and (3) determine clinician preferences and perceptions about communication during a public health emergency to improve the process.

METHODS

Process Analysis

To describe the process for communicating guidance to frontline clinicians in Utah, we interviewed key informants and diagrammed process and information flow using business process modeling techniques.(23) The key informants represent clinical and epidemiologic leaders from the state and largest county health departments and the two major healthcare organizations in Utah with a combined majority of the market share in the state. Between May and July 2009, we gathered information from the most senior epidemiologist at the Utah Department of Health (UDOH) and the Salt Lake Valley Health Department (SLVHD), and from clinicians and administrators at the two major healthcare organizations in Utah: Intermountain Healthcare (Intermountain) and University of Utah Healthcare (University). Several study authors (PG, SM, RR, ATP, BW, IR, AVG, CLB) were key participants in surveillance and guidance development activities. Findings were validated by the above key participants and senior leadership at Intermountain and University. We reviewed the guidance emailed from Intermountain to clinicians and information posted on the CDC, UDOH, and SLVHD websites between May 1 and May 11.

Survey

Study population—The study population included office-based primary care clinicians located in urban and rural communities throughout Utah. We used three major Utah-based organizations to reach the study population. We surveyed clinicians affiliated with University, including 98 clinicians with the community clinics and 17 pediatricians affiliated with the Department of General Pediatrics. We surveyed 315 primary care clinicians employed by or affiliated with Intermountain, an integrated healthcare system that operates over 100 ambulatory care clinics throughout Utah. These clinicians were identified by the Intermountain Healthcare Office of Physician Relations. Finally, we surveyed 79 office-based primary care clinicians from small group practices in rural Utah not affiliated with Intermountain or University. These clinicians were identified by *HealthInsight*(24), a not-for-profit community based organization that routinely works with independent office-based primary care providers throughout Utah. *HealthInsight* is the Agency for Healthcare Research and Quality designated Chartered Value Exchange, the Health Information Technology Regional Extension Center, and the Medicare Quality Improvement Organization in Nevada and Utah.

Survey design and procedure—We performed a descriptive, cross-sectional survey that included questions to assess clinicians' use of and access to public health guidance concerning the detection, treatment, prevention, and control of novel influenza A (H1N1) virus; knowledge about public health reporting and guidelines; and preferences and perceptions about different sources of information. An email with a link to an anonymous Web-based survey was sent to study participants. Two (Intermountain) or three (all others) sequential e-mails were sent at least one week apart. Individual clinicians could respond to the survey only once. Surveys were completed between May 26 and June 30, 2009, during the first wave in Utah (Figure 1).(25) Institutional Review Board approval was obtained from Intermountain and the University of Utah.

Survey data analysis—We used descriptive statistics to describe the frequency and sources of information pushed to the clinicians in Utah, the frequency and sources of web-based information they accessed, and clinician knowledge about public health guidance that

would affect a clinician's clinical decision-making. We specifically queried about four potential email sources from the CDC, UDOH, Intermountain, and University. We used Fisher's exact test to compare responses between clinicians employed by Intermountain, University, or neither organization (other).

To assess clinician preferences and perceptions about communication, we used three strategies. We queried about their primary source of information for clinical decision-making and classified sources as institutional, local/state public health, national, or other. We assessed the relationship between the number of email sources and the clinician's perception about the amount of email received. We used the Fisher's exact test to compare the observed and expected percentages, assuming that perceptions of email amount were independent of the numbers of email sources. Finally, we performed a qualitative analysis of the responses to an open-ended question. The free text comments were coded using an adaptation to the Grounded Theory Approach (18) and then grouped into themes.

RESULTS

Analysis of communication processes as the pandemic unfolded

On April 24, 2009 (Figure 1), the CDC reported that a novel influenza A virus was responsible for a large outbreak of respiratory illness in Mexico and was associated with widespread human-to-human transmission. The key informant interviews, process analysis, and communication artifacts (websites, emails, and alerts) illustrated the activated public health response to the threat of pandemic influenza. During the ensuing weeks, communication efforts increased both nationally and locally to serve the information needs of clinicians and to enhance compilation of surveillance data.

On the national level, the CDC used several established communication systems to target clinicians, including Clinician Outreach and Communication Activity (COCA) emails, Health Advisory Network (HAN) alerts, and Morbidity and Mortality Weekly Report (MMWR) dispatches and publications (Figure 2).^(7,14–17) The COCA alerts target clinicians. HAN alerts and MMWR target both clinicians and public health stakeholders. The CDC also created an H1N1 website to post information for clinicians, public health partners, and the community. During the first two weeks of the emergency, new content was posted daily.

In Utah, UDOH used a statewide faxing system and an existing electronic mailing list, routinely used to deliver weekly Infectious Disease Updates to clinicians, to deliver 'daily H1N1 situation reports' to frontline clinicians (Figure 2). UDOH created an H1N1 website to provide updated information for clinicians and the public.⁽²⁶⁾ During the first two weeks of the outbreak, new content was posted or faxed daily, except Sunday. The predominant healthcare organizations in Utah (Intermountain and University) used their existing electronic mailing lists and institutional websites to communicate with employed and affiliated clinicians. Multiple authorities and specialists sent email within each organization (Figure 2). Some organizations have multiple institutions offering their own specialized guidance (e.g. the Children's Hospital).

Communication generation and content analysis

Multiple organizations were performing surveillance, gathering epidemiologic information, creating guidance (e.g., treatment, testing, personal protective measures, etc) and situational reports, and disseminating information directly to frontline clinicians (Figure 2). In Utah, guidance was developed or modified to address problems, constraints, and goals within the state or healthcare organization or individual institutions. Public health epidemiologists and infectious disease experts were spending several hours each day manually reviewing

information from multiple sources to update and create new guidance. The key informants noted that information in guidance documents was usually designed to meet institutional needs and resources rather than to provide a comprehensive set of all the information required by frontline clinicians. For example, early CDC guidance described which patients should be tested, and then included the caveat that “Clinicians should be aware of local guidance on testing.”(27) Simultaneously, healthcare institutions tailored messages based on the availability of their resources (e.g., PPE, antiviral medications, vaccine) and included links to public health websites but did not explicitly describe differences.

At two weeks into the outbreak, CDC and UDOH started specifying the ‘date of last update’ for content linked to their Websites, but they did not identify the updated content within the multi-page documents. Therefore, the reader would have had to read the entire document and determine new content on his/her own. In addition, we identified inconsistencies: one guidance document posted two weeks into the emergency included four different names for the virus: ‘novel Influenza A H1N1’, ‘2009 H1N1 Influenza A’, ‘S-OIV infection’, ‘novel H1N1 flu (swine flu)’.(28) This reflected the national and international confusion regarding the nomenclature for this virus.

Description of survey respondents

Of the 509 clinicians surveyed, 141 (28%) responded and were included in this analysis; 7 were excluded because they did not practice office-based primary care, and 368 did not complete the survey. The respondents were experienced clinicians, mostly physicians (95%), with a median of 15 years of professional experience. Half (46%) of the respondents reported that at least one-fourth of their patients were younger than 18 years of age. The respondents worked in outpatient primary care settings located in seven of the eight multi-county Utah health districts, comprising rural and urban communities throughout Utah. The clinicians were employed by Intermountain (n=53), University (n=32), both Intermountain and University (n=1), and neither of these organizations (other) (n=55). The three groups of clinicians had similar years of experience and pediatric practice, although University clinicians were less likely to work fulltime seeing patients ($p < .01$).

Description of communication received and sought by clinicians

During the first month of the outbreak (Figure 1), a majority (68%) of frontline clinicians received information pushed from UDOH, either by fax (38%) or email (56%); 21% received the information emailed by the CDC COCA system. Receipt of email messages from UDOH or CDC was not related to a clinician’s employer. In contrast, UDOH faxes were less likely to be received by Intermountain (34%) or University (12%) clinicians than other (58%) clinicians ($p < 0.0001$). Nearly 100% of the respondents employed by Intermountain or University received the emails from their Chief Medical Officer. The emails from Intermountain also reached 68% of the clinicians in small-group, rural practices unaffiliated with Intermountain, although they might have admitting privileges at Intermountain facilities.

Respondents’ use of websites during the first month of the outbreak varied. Approximately half (53%) reported visiting the CDC H1N1 flu website at least once each week. In contrast, only one-third visited the UDOH (35%) or their institutional (38%) website at least once each week. Half the respondents never sought information from the UDOH website (50%) or their own institution website (46%); 17% never visited the CDC website. Two-thirds (67%) of the clinicians did not read MMWR during the first month. Use of websites did not significantly differ by clinician affiliation ($p > 0.09$).

Clinician knowledge about public health guidance

The respondents had a high level of correct knowledge for questions about high-risk groups, testing, and treatment (Table 1). These guidelines remained fairly constant during the one-month survey period. However, when guidance changed during the survey period, (e.g., reporting requirements), the subsequent survey respondents had lower levels of correct knowledge (Table 1). There was no significant difference by clinician affiliation ($p > 0.05$).

Clinician preferences and perceptions about communication

Primary sources of information for clinical decision-making—Concerning who and how to test for the emerging influenza virus, most (73%) Intermountain and University clinicians used their own institution as their *primary* source of information; in contrast, the other clinicians used institutional (38%), state (33%), and national (24%) sources as their *primary* source ($p=0.001$). Table 2 demonstrates primary sources of information for all respondents. Concerning treatment guidance, institutional sources were the preferred source (55%), regardless of employer; CDC (28%) and local/state public health (13%) sources were less frequently preferred. For patient educational materials, the CDC website (40%) and institutional sources (32%) were the preferred sources, regardless of employer. For population-based data about the epidemiology of influenza, the clinicians used resources from their institution (91%), local/state public health (61%), and the CDC (53%).

Perception about email load—More than half (61%) of the clinicians received email from two to four of the sources included in our survey. Over half the Intermountain (61%) and University (56%) clinicians believed they received ‘too much’ email. In contrast, only one-third (35%) of the other clinicians thought they received ‘too much’ email ($p=.005$); 18% thought they received ‘too little’ email communication. Regardless of a clinician’s employer, those receiving email from one of the sources were significantly more likely to report that the amount was ‘just right’, and those receiving email from three of the sources were more likely to report that the amount was ‘too much’ ($p\text{-value} \leq 0.02$).

Qualitative analysis of clinician feedback—Almost half of the respondents (42%) answered the question, “Please provide comments about good and bad aspects of the communication you received about the swine flu.” The comments were classified into seven categories. The six most frequent categories included negative feedback in the following descending order of frequency: ‘amount of email communication’, ‘Quality of information contained in the email’, ‘Usefulness of information’, ‘source of email communication’, ‘timeliness of email delivery’, and ‘length of email’. The seventh and least frequent category was ‘general positive feedback’.

The clinician’s comments could be grouped into four themes (Table 3). The *first* theme addressed concerns about being overwhelmed by email. The clinicians describe emotional responses while trying to use information in the emails. There were dramatic statements including one that described the scene in their office as a “comic opera” and another that observed, “It seemed most of the information was driven by hysteria.” The respondents perceived the amount of email they received as “way too much.” The *second* theme addressed concerns about receiving appropriate information to act. The clinicians commented about usefulness, quality, timeliness, and accuracy of the information and the impact on their ability to appropriately treat patients. The comments described the information as “confusing at times regarding proper testing” and “seemed to change daily.” The *third* theme addressed concerns about the trustworthiness of the emails’ source. The clinicians commented that “medical office emails duplicated health department ones, reading both to find discrepancies was too time consuming”, and “if [healthcare institution] recommendations are different than the CDC’s, then this difference should be explicitly

noted and explained.” The *fourth and final* theme concerned clinicians’ suggestions to improve communication during future public health emergencies. They suggested that communication be more concise and clearly highlight information tailored to the local environment that is *new or different* from public health recommendations.

Communication process after survey

During the summer of 2009, in preparation for wave two, a new organizational strategy for communication was established in Utah. Leaders from UDOH, Intermountain, University, and other smaller healthcare organizations operating in Utah created a taskforce to coordinate public health messaging and create unified messages. Chief Medical Officers were assigned the responsibility for distributing a unified message within their organization. In addition, UDOH changed the email message format to prominently display new and updated information using bullets at the top of each email.

DISCUSSION

To the best of our knowledge, this study is the first to present an objective analysis of communication between public health agencies, healthcare organizations, and frontline clinicians during a public health emergency. Frontline clinicians were receiving and seeking clinical guidance from multiple sources. The creation and distribution of content from national and local sources was often redundant. The volume of email related to H1N1 was too great for most clinicians to process efficiently. Healthcare organizations and institutions played a key role in distributing public health guidance to clinicians, and were the preferred source for treatment and testing guidance for clinicians employed by a healthcare system. Clinicians identified websites as an important source of information, yet only one-third visited websites frequently enough to access up-to-date information tailored for Utah clinicians. Respondents had a high level of knowledge about the testing and treatment of novel influenza A (H1N1) when guidance was stable; however, correct knowledge was lower after guidance changed, as in the case of reporting requirements. Frontline clinicians offered important practical suggestions for improving communication.

The process analysis validated our hypothesis that the current communication process is multidirectional, redundant, relies on daily action, and requires effort to be expended by personnel at many organizations to achieve the same task. Within Utah, epidemiologists and physicians at health departments and healthcare institutions were reviewing the situation and new guidance daily to identify changes, determine a response, and craft messages. Each source would then attempt to communicate directly with clinicians, resulting in communication overload. An organizational communication model described by Te’eni et al may explain communication problems we observed (29). They propose that action-oriented messages intending to improve clinical decision-making (29) should contextualize the information and use short, structured messages. These principles may improve the design of emails and websites and allow the clinician to quickly identify new information.

The survey provided unique information about communication during a public health emergency. Clinicians reported using public health websites, but not frequently enough to keep up with frequent changes. While most clinicians reported receiving email from multiple sources, most clinicians affiliated with an institution preferred their institutional source for guidance about testing and treatment. Given the potential for communication overload and preference for institutional sources, public health emergency communication plans should bring together public health agencies as sources of accurate information with existing institutional communication channels to distribute guidance to their affiliated clinicians. This could maximize the benefits of consistent and authoritative technical recommendations developed by national and state subject matter experts and the trusted and

convenient aspects of institutional resources. In the future, the increasing use of electronic health records may enable the distribution of public health alerts directly within the clinician workflow.(30)

The qualitative analysis of comments from the frontline clinicians provided a synthesis of communication problems and suggestions for improvement. The most important suggestions included: 1) limit email to a single credible source, such as the Chief Medical Officer from the local healthcare institution 2) identify new information so clinicians do not have to search for it, and 3) note when local recommendations differ from CDC recommendations and explain why differences exist. These findings support previous empiric recommendations to identify a local credible, authoritative communication leader and deliver one straightforward message using a clear communication pathway that is developed in consultation with healthcare providers. (4) (5,10)

Our study results informed the communication plan in Utah for the second wave of the outbreak (Figure 1). During the second wave, the incidence of disease worsened; however, based on the author's experience (PG, MA, JS, SM, RR, ATP, BW, IR, AVG, CLB), changes in communication reduced the number of email sources, improved synchronization and clarity of messages, and appeared to better support clinicians. Several factors may have contributed to improvement. First, using data from this study and resources from the CDC-funded Center of Excellence in Public Health Informatics (grant #8P01HK000030), we rapidly developed the new organizational strategy for communication. The taskforce established by leaders from UDOH and the major healthcare organizations during the summer of 2009 resulted in coordinated public health messaging. We believe the enhanced communication allowed the state to respond effectively to the second wave of the pandemic and for clinicians and hospitals to provide care for patients with H1N1 infection while maintaining normal operating procedures.

Our study has several limitations. First, the survey response rate was low. Physician surveys often have low response rates (31) and this survey was undertaken during a public health emergency. Nevertheless, objective and qualitative information was provided by 141 experienced clinicians throughout Utah. In addition, the low response rate may have introduced bias that underestimates communication problems. The clinicians who responded to our email may have been more technologically competent and less overwhelmed with email than clinicians who did not respond. It is also possible, though, clinicians with a higher level of frustration were more motivated to complete the survey. Despite these limitations, the qualitative findings support the process analysis and survey results and provide rich details about the frontline clinician's experience with communication during the midst of a public health emergency. Our findings provide more comprehensive and objective information about communication with frontline clinicians during the pandemic than described in recent publications. (5,12,13)

Conclusion

During a public health emergency, frontline clinicians would prefer a single source of authoritative information and the ability to easily recognize new information or information specific to their location or practice that differs from national sources. Clinicians often prefer to receive information from their healthcare institution. Therefore, when developing strategies to communicate during public health emergencies, planners should consider distribution networks within healthcare organizations and institutions in their jurisdiction. Public health authorities can collaborate with these institutions to distribute public health messages to affiliated clinicians. We recommend a single email from an institution with any differences from national or state guidance explicitly explained.

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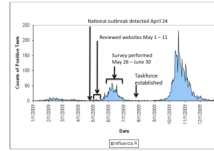


Figure 1.
Daily counts of positive tests for influenza A, Intermountain Healthcare, Utah, 2009

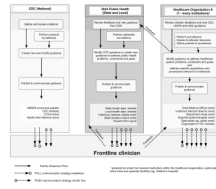


Figure 2. Communication between public health agencies, healthcare organizations, and frontline clinicians during the first wave of the 2009 influenza A (H1N1) outbreak.

Table 1

Knowledge among primary care providers concerning public health guidance delivered during the first wave of the novel influenza A (H1N1) outbreak (n=141).

	False	True	Don't know
Pregnant women are considered high-risk for serious illness if they acquire swine flu	5%	88% *	7%
Rapid point-of-care tests for influenza A can distinguish between seasonal influenza A and the swine flu influenza	99% *	1%	1%
The recent outbreak strain of swine flu is susceptible to oseltamivir (Tamiflu™)	3%	96% *	1%
The only reliable test to confirm or rule out swine flu is the PCR test at the Utah Public Health Laboratory or the CDC	16%	79% *	4%
Children under 5 years of age are considered high-risk for serious illness if they acquire swine flu	9%	86% *	5%
The current recommendations for patients with probable or confirmed swine flu is to exclude them from school or work for 7 days after their first day of symptoms or for 24 hours after their symptoms resolve whichever is longer	4%	90% *	6%
Question with answer that changed during the survey period:			
Only hospitalized cases of swine flu influenza are reportable to public health			
prior to June 8 th (n=63)	90% *	5%	5%
after June 8 th (n=54)	48%	46% *	6%

* correct answer

Table 2

Primary sources of information used by primary care providers during the first wave of the novel influenza A (H1N1) outbreak (n=141).

	% of respondents			
	Institutional	Local/State public health department	CDC	Other
Primary source of information about who & how to test	60%	22%	13%	6%
Primary source of information about treatment	55%	13%	28%	4%
Educational materials to share with patients (n=121)	32%	16%	40%	11%

Table 3

Themes that emerged in comments from clinicians in response to an open-ended question requesting feedback

Theme 1	Overwhelmed by email communication
Description:	Describes the emotional response to the communication
Sample feedback:	<ul style="list-style-type: none"> • “The communication was too confusing and voluminous to be helpful.” • “Daily memos are information overload. Eventually I stopped reading them.” • “I received 10–20 emails/day, all with virtually identical info; the problem was, I didn’t know which ones were new/different.”
Theme 2	Appropriate information to act
Definition:	Describes the difficulties of using the information relayed through emails to determine how to best treat patients.
Sample feedback:	<ul style="list-style-type: none"> • “Recommendations on contact and respiratory isolation/protection procedures were not particularly helpful.” • “Extremely confusing.”
Theme 3	Trusting the source
Description:	Describes the difficulties of sifting through information from several different agencies
Sample feedback:	<ul style="list-style-type: none"> • “One source would be best.” • “There were inconsistencies between what the CDC, State of Utah and our healthcare system were advocating in terms of testing and treatment – mainly due to differences in available resources and lack of coordination locally.”
Theme 4	Improve communication
Description:	Describes suggestions to improve email and other communication strategies
Sample feedback:	<ul style="list-style-type: none"> • “...if you need to update please highlight changes so we know what we really need to read of new version.” • “A single web site with consistent and updated info would work better.” • “It would have been very useful to have email with a bulleted list of changes and [a] summary of [the] current state of the epidemic/treatment/testing...”.