HHS Public Access

Author manuscript

J Public Health Manag Pract. Author manuscript; available in PMC 2019 April 30.

Published in final edited form as:

J Public Health Manag Pract. 2013 ; 19(4): E27–E32. doi:10.1097/PHH.0b013e3182703e1c.

Assessment of Public Health Perspectives on Responding to an Emerging Pathogen: Carbapenem-Resistant *Enterobacteriaceae*

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Abstract

Context: Public health has an important and critical role in responding to emerging multidrug-resistant organisms, such as carbapenem-resistant *Entembacteriaceae*. The Centers for Disease Control and Prevention developed a survey as a tool for state health departments to determine carbapenem-resistant *Enterobacteriaceae* prevalence within their region.

Objective: This report summarizes an assessment of the health department experience with the survey, their perceived roles and responsibilities in responding to an emerging health care-associated pathogen, and potential barriers to public health engagement of acute care facilities in response activities.

Design: Key informant interviews consisting of open-ended and 5-point Likert scale questions were conducted.

Participants: Interviewees represented state health departments that administered the survey and select states that did not.

Results: Of 11 states interviewed, 7 (64%) had administered the survey to acute care facilities. Despite similar competing priorities and concerns about administering the survey, different perspectives emerged among the 11 states; those that administered the survey regarded it as a learning opportunity, whereas other states emphasized concerns about survey logistics and other public health demands. All 11 states perceived the prevention of an emerging pathogen to be a public health priority, but the degree of their action depended on availability of resources and existing relationships with infection preventionists. Health departments had less interaction with other hospital personnel (eg, facility leadership) and limited knowledge of the roles and associated responsibilities of other health care partners (eg, Quality Improvement Organizations).

Conclusions: Although considered a public health priority, response efforts to emerging *J Public Health Management Practice,* 2013, 00(00), 1–6 Copyright © 2013 Wolters Kluwer Health | Lippincott Williams & Wilkins pathogens were reported to vary among state health departments. A better understanding is needed of the factors that motivate and facilitate state health departments to engage in a public health activity despite the challenges of competing priorities and limited

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No conflicts of interest and source of funding were declared by all the authors.

resources. Efforts should also focus on improving the relationship between health departments and hospital leadership and other health care partners.

Keywords

emerging infectious disease; infection control; public health practice

The emergence and spread of multidrug-resistant health care–associated pathogens pose a serious threat to public health. These organisms are resistant to most available antimicrobial agents, leaving few options for treatment. Multidrug-resistant organisms (MDROs) of special concern are carbapenem-resistant *Enterobacteriaceae* (CRE), which are highly resistant gram-negative bacteria causing infections with mortality rates as high as 40% to 50%.[1] Since first reported in North Carolina in 2001, CRE have now spread across most of the United States and to other countries worldwide.[1–5] As with other MDROs, outbreaks of CRE follow the flow of colonized patients across regional health care facilities.[6,7] Thus, a coordinated regional approach to MDRO prevention that engages health care facilities is essential and has only been achieved where local or regional public health authorities have taken on an active leadership role.[8–10] Because state and local health departments are uniquely situated to interface with all health care facilities within a region, they can effectively coordinate local and regional CRE response efforts by providing updates to facilities about regional CRE prevalence to increase awareness of the current status ("situational awareness"), facilitate interfacility communication, and promote implementation of recommended infection prevention measures.[8,9,11,12]

In September 2010, the Centers for Disease Control and Prevention (CDC) designed a survey for health departments to estimate regional CRE prevalence and to assess facility implementation of recommended CRE surveillance and prevention measures by querying infection preventionists (facility personnel who manage issues related to infection control and health care-associated infections [HAIs]).[12] The survey was intended to assist health departments in taking an active leadership role in coordination of a regional response to an emerging pathogen, as well as to learn about the CRE status within their states. State health departments were notified through multiple electronic listservs about a CDC-led conference call to discuss actionable steps for CRE prevention. All 15 health departments that participated on this initial call, as well as one other health department that later contacted the CDC but was not on the call, were given the survey to consider administering within their jurisdiction. The CDC conducted a formative evaluation through the use of key informant interviews with representatives from state health departments to assess their survey experience as well as their perceived roles and responsibilities in responding to an emerging pathogen in health care settings and the potential barriers to public health engagement of acute care facilities in response activities. This report describes the results of these formative interviews and discusses implications for future efforts to improve public health response to MDROs.

Methods

During February to March 2011, all 16 state health departments that had received the CRE survey were asked to participate in key informant interviews. Among states that agreed to participate, key informant interviews were conducted with the primary contact for coordinating the surveillance and/or prevention of HAIs (HAI coordinator) at the respective health department. These HAI-related responsibilities generally fall under the HAI program located within the communicable disease unit at most state health departments. On the basis of ongoing communications, we knew which health departments had administered the CRE survey and which ones had not. A script containing open-ended and 5-point Likert scale questions was used by a trained interviewer and consisted of the following question domains: CRE survey activity, survey logistics (among states that conducted the survey), and communication issues and concerns (all states interviewed); health department roles and responsibilities regarding surveillance and prevention of emerging health care–associated pathogens; and health department relationships among health care partners (infection prevention-ists, State Hospital Associations, and Quality Improvement Organizations [QIO]). The 5-point Likert scale ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Data were coded for themes and aggregated into standardized categories, using qualitative research methods. Responses were compared between states that had administered the survey and states that had not.

As a programmatic evaluation without involvement of patient information or direct contact with health care institutions, these interviews were considered exempt from review by the Office of Management and Budget and by the CDC Institutional Review Board.

Results

Eleven (69%) of 16 state health departments participated in the interviews. These included all 7 (64%) states known at the time to have conducted the CRE survey, and 4 (36%) states that had not. Participants represented states from the following geographical regions: northeast (n = 1), southeast (n = 4), Midwest (n = 3), southwest (n = 1), and west (n = 2). By number of hospitals per state, 4 participating states had 50 or fewer hospitals, 3 had 51 to 100 hospitals, and 4 had more than 100 hospitals.

CRE survey activity

Of the 7 states that had conducted the survey, 5 reported surveying infection preventionists electronically and 2 reported distributing paper surveys to infection preventionists at regional meetings. At the time of these interviews, 5 states had provided feedback of survey results to health care facilities, and 2 had not. Regarding personnel time spent on survey activities, all 7 states reported the involvement of at least 2 staff personnel and an estimated median duration of 15 hours per state (range, 5-25 hours), although 1 state had not completed its survey analysis at the time of these interviews.

The majority (91%) of the 11 states reported communicating with infection preventionists about health care-associated topics on at least a monthly basis. Prior to the CRE survey, 7 (64%) states (including 3 of the 4 states that did not administer the CRE survey) reported

having conducted some kind of a survey to infection preventionists in the previous 12 months.

When deciding whether to conduct the CRE survey, 10 (91%) states reported competing priorities that demanded staff time and resources, including the enrollment of facilities into the National Healthcare Safety Network surveillance system (for HAIs) and administration of other surveys. Furthermore, 8 (73%) states, including 3 that did not administer the CRE survey, reported the perception of overburdening infection preventionists (Table). Competing priorities and concerns did not differ between states that conducted the CRE survey and those did not.

When the 11 states were asked what advice they would give to another health department that is considering a similar survey in a situation involving an emerging pathogen, divergent themes were identified in the responses between states that conducted the survey and those did not. States that conducted the CRE survey regarded it as an opportunity to learn about their regional CRE prevalence and current facility practices, whereas states that had not conducted the survey advised a more cautious approach, as reflected in the following themes: need more clarity of the survey intent and the roles and responsibilities of the health department, sensitivity to other priorities and oversurveying infection preventionists, and consider alternative sources of information (eg, laboratory directors).

Health department roles and responsibilities

On a 5-point Likert scale, all 11 states *agreed* or *strongly agreed* (ie, 4 or 5) that the prevention of an emerging MDRO, such as CRE, is a public health priority. However, a few (18%) states reported that competing priorities and decreased resources could make it difficult “to get buy-in from [health department] leadership when the threat is not well-defined.”

When asked about specific prevention and surveillance activities, all 11 states *agreed* or *strongly agreed* that the following were important public health roles: conduct surveillance for emerging pathogens; assist facilities in outbreak investigations; and provide situational awareness to facilities about the prevalence of an emerging pathogen, although states reported that this was rarely performed. Two activities with greater variability in the range of ratings included facilitating the implementation of appropriate infection prevention measures (mean, 4.6; range, 2.75-5) and providing education to infection preventionists (mean, 4.5; range, 3-5). Some states commented that their HAI program “makes recommendations [to facilities] only” but has “no regulatory or licensing authority” to enforce recommended measures. The lack of resources and opportunities were reported by some health departments for having a limited role in providing education to infection preventionists. These responses did not differ between states that conducted the CRE survey and those that did not.

Health department relationships among health care partners

When asked to describe their relationship with infection preventionists in their state, all interviewees responded positively, with several (36%) emphasizing that recent federal

funding to state health departments have allowed for "dedicated staff and better and more consistent outreach" to infection preventionists. All 11 states also *strongly agreed* that infection preventionists were important partners of the health department. Regarding the statement that health departments depended more on infection preventionists than vice versa, the mean rating was 3.6 (range, 3-5). When interviewees were asked if one of the responsibilities of infection preventionists is to respond to health department requests, the mean rating was 4.3 (range, 3-5). Regarding whether states felt that public health demands overburdened the infection preventionist community, there was less consensus, with a mean rating of 3.1 (range, 2-4). Some felt that it was dependent on the situation (36%), whereas others perceived infection preventionists to be generally "overburdened by demands from all directions" (45%). These responses did not differ between states that administered the CRE survey and those that did not.

When asked to describe their relationship with hospitals (excluding the infection preventionists) in their state, the interviewees' answers varied from "good" to "tough", with the most common being, "[I] don't know." Several states indicated that apart from infection preventionists and occasionally laboratory personnel, their HAI programs did not interact much with other hospital personnel (45%).

When states were asked whether they agreed that hospitals were more responsive to the State Hospital Association than to the health department, the mean rating was 3.3 (range, 2-5); 2 states had insufficient knowledge to rate the question. Several states felt that while hospital administration was more responsive to the State Hospital Association, the hospital infection preventionist had a better relationship with the health department (45%).

Responses varied greatly regarding whether hospitals were more responsive to the QIO than to the health department. The mean rating was 2.9 (range, 1.5-5) and did not include 3 states with insufficient knowledge to rate the question. Some states perceived the QIO to be "influential," whereas others felt the QIO shared "the same struggles as the [HAI programs of] health department in finding the right people [at the hospital] to do things for them."

Discussion

Through our formative evaluation of the CRE survey experience, our interviews indicated that state health departments that administered the survey considered it a worthwhile endeavor despite having competing priorities and similar concerns about the survey as states that did not administer the survey. Although all interviewed states perceived public health to have an important role in responding to an emerging pathogen, the extent of their surveillance and prevention activities largely depended on the availability of resources and existing relationships with infection preventionists, who were the only direct health care facility contacts for several of the HAI programs.

We found that some HAI coordinators of health departments had less interaction with other hospital personnel (eg, facility leadership) and limited knowledge of the roles and associated responsibilities of other health care partners (eg, State Hospital Associations and QIOs). This finding likely reflects the differences among hospitals and health care entities in their

willingness to work with health departments, highlighting the difficulty for public health to fully penetrate the health care arena and establish itself as an important partner. To strengthen the role of public health and its engagement of health care facilities, recent federal funding has enabled almost every state health department to establish an HAI program with dedicated staff to work more closely with facilities.[13] While this has led to a better collaboration with infection preventionists, health departments still need to improve their relationships with hospital leadership and other health care partners to effectively engage facilities in regional HAI response activities. As demonstrated in several infection prevention collaboratives (groups of facilities engaged in common efforts to reduce HAIs), the support of facility leadership to prioritize the implementation of recommended prevention measures was essential to the success and the sustainability of these initiatives.[9,14-18] Methods to increase interactions with facility leadership may include targeted communication efforts (eg, periodic updates through newsletters and in-person meetings), working through federal and state regulatory agencies, and partnering with State Hospital Associations and QIOs that have already established connections, which may help to improve the relationship of the health department with these specific health care entities as well.

As expected, overburdening infection preventionists was a perceived concern of some of the interviewed states. We also found that some preferred an alternative data source for conducting regional MDRO surveillance, such as surveying facility laboratory directors. Such an approach may actually be more practical, allowing health departments to directly query microbiology results without having to place additional demands on infection preventionists.

Several of the 11 states reported insufficient efforts on their part to provide situational awareness to facilities. By disclosing which facility currently has a CRE outbreak and improving interfacility communication, health departments might enable surrounding facilities to be alert for CRE when receiving patient transfers from affected facilities so that appropriate measures can be implemented immediately to reduce regional CRE dissemination. However, some health departments are concerned about potential unintended consequences from disclosing the CRE status of individual facilities, such as damaging existing relationships and alienating facilities from working with health departments in the future. Another perceived concern is that the disclosure of a facility's status may impact its reputation and potentially be misconstrued as public health endorsement of other facilities that have not reported CRE activity.

Although all 11 states considered the control of an emerging MDRO to be a public health priority, interestingly, only 7 actually conducted the CRE survey. While we know the reasons from our interviews why 4 states did not administer the survey, we do not know for the other states that were on the CDC-led call (where the survey was introduced) or why so few states participated on that call (30% of all 50 states). Possibly these other states shared similar concerns as those 4 states and/or had other priorities at the time, limited resources, and/or minimal awareness of the urgency and importance of CRE prevention. However, after the completion of these interviews, we have learned of several states that subsequently surveyed

facilities about CRE or another emerging pathogen, some using the CDC-designed survey and others conducting a laboratory-based survey.[19-21]

Our interviews had certain limitations. Because only a small sample of states was interviewed, these data may not be generalizable. There was also underrepresentation of states from densely populated regions with high concentration of health care facilities as well as areas with high CRE prevalence (eg, northeast). Thus, our data may not reflect the perspectives and response activities of health departments in those regions. Furthermore, because participation in the interviews was voluntary, our sample may be biased toward states with more interest and resources dedicated to the prevention of an emerging pathogen and that may have done more work in this area. In addition, our interviews with each state were generally conducted with a single individual who was identified by each health department as being the primary contact for the coordination of all health care-associated activities at the state and thus the self-report responses may not be fully representative of the entire health department perspective on responding to emerging MDROs. Nevertheless, these findings can serve as a basis for conducting more detailed assessments of health department perspectives and activities and to identify additional barriers and facilitators to public health response efforts.

In summary, improving the collaboration between health departments and acute care facilities (eg, facility leadership) and other health care partners (eg, State Hospital Associations and QIOs) is an important step to better identify and respond to emerging threats such as CRE. Further efforts are needed to understand factors other than competing priorities and limited resources that may impact a health department's willingness to take action. The control of emerging MDROs requires strong leadership from local and regional public health authorities responsible to track spread, monitor control efforts, and provide situational awareness to facilities so that tailored and focused strategies to prevent transmission may be employed.

Acknowledgments

The findings and conclusions in the report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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TABLE

Competing Priorities and Concerns of State Health Departments (N = 11)

Themes	Proportion of State Health Departments[a] (%)
Competing priorities at the time of the CRE survey	
NHSN activities (eg, enrollment of health care facilities, data validation)	5/10 (50)
Other surveys (eg, needs assessment)	3/10 (30)
Outbreak response	3/10 (30)
Limited staff	2/10 (20)
Other health care–associated infection program activities (eg, prevention collaboratives)	2/10 (20)
Administrative work	1/10 (10)
Concerns about the CRE survey	
Perception of overburdening infection preventionists	5/8 (63)
Redundancy (overlap with other surveys)	2/8 (25)
CRE not perceived as a priority by infection preventionists	1/8 (13)
Purpose of the survey unclear and not relevant at the time	1/8 (13)
Did not want to collect information that could be disclosed to the public via state “Sunshine laws”	1/8 (13)

Abbreviations: CRE, carbapenem-resistant *Enterobacteriaceae*; NHSH, National Healthcare Safety Network.

[a]State health department representatives could mention more than 1 theme.

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