Clinicians’ Perceptions of the Problem of Antimicrobial Resistance in Health Care Facilities

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Background: Many clinicians do not comply with guidelines regarding antimicrobial resistance (AR). In response, the Centers for Disease Control and Prevention developed a national Campaign to Prevent Antimicrobial Resistance in Healthcare Settings that presents 4 strategies and 12 evidence-based steps.

Methods: To assess clinicians’ perceptions of AR, barriers and facilitators to preventing AR, and how best to reach clinicians, a questionnaire and 4 focus groups were conducted after presentation of the Campaign at 4 Pittsburgh Regional Healthcare Initiative hospitals.

Results: One hundred seventeen clinicians completed the questionnaire; 28 participated in the focus groups. Clinicians were significantly more likely to perceive that AR was a problem nationally than in their own institution (95% vs 77%; P < .001) or practice (95% vs 65%; P = .002), consistent with focus group results (93% nationally vs 46% institution or practice). The 3 Campaign steps with the most barriers to implementation were “Treat infection, not colonization” (35%), “Stop treatment when infection is cured or unlikely” (35%), and “Practice antimicrobial control” (33%). Clinicians in the focus groups cited the additional barriers of the health care culture, lack of knowledge, and the nursing shortage; facilitators included education, information technology, and consults. Computer programs, posters, and local data were suggested for reaching clinicians about AR.

Conclusions: Clinicians perceive AR to be a complex national problem but less relevant to their own institution or practice. Providing clinicians with information and steps for preventing AR, as in the Campaign, may affect their perceptions of the problem and motivate them to take actions to ensure patient safety.

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timicrobial therapy; implementing infection control programs; and establishing surveillance systems for detecting and reporting resistance. However, many clinicians do not comply with these guidelines and recommendations.

To raise awareness among clinicians about the problem of AR and to motivate their interest and acceptance of methods to prevent it, the Centers for Disease Control and Prevention has developed a national Campaign to Prevent Antimicrobial Resistance in Healthcare Settings. Targeted at clinicians, the Campaign features several 12-step programs for preventing AR in various patient populations, such as hospitalized adults. The Campaign focuses on 4 strategies for preventing AR: Prevent infection, Diagnose and treat infection effectively, Use antimicrobials wisely, and Prevent transmission. Within the 4 major strategies are 12 specialty-specific action steps based on evidence-based guidelines and recommendations. Taken as a framework, the 4 strategies and 12 steps provide clinicians in a variety of specialties with a comprehensive plan for preventing AR (Table 1).

The Campaign is presented through a didactic slide set and is supported by other educational materials, such as clinician pocket cards and posters, all of which aim to affect clinician awareness and perceptions of the problem of AR and to motivate clinicians to actively incorporate the prevention messages into their personal practice of medicine.

This study assesses clinicians' perceptions of the problem of AR, barriers and facilitators to preventing AR in health care settings, and how best to reach clinicians regarding the problem of AR.

### METHODS

Data were gathered using quantitative and qualitative methods to assess clinicians’ perceptions of the problem of AR and how best to reach clinicians on this issue. The quantitative portion involved 4 Pittsburgh Regional Healthcare Initiative (PRHI) partner hospitals, where clinicians completed a questionnaire after a presentation of the Campaign. The qualitative portion consisted of 4 focus groups with a sample of clinicians who had attended the Campaign presentation and a sample of clinicians who had not.

The PRHI is a coalition of 40 Pittsburgh-area health care facilities, insurers, employers, health care providers, corporate and civic leaders, and public health professionals dedicated to improving health care quality and patient safety. The 4 PRHI hospitals that participated in this study included a suburban hospital with 314 beds, a rural community hospital with 239 beds, an urban teaching hospital with 811 beds, and a small urban hospital with 314 beds. The Campaign was presented via slides (PowerPoint; Microsoft Corp, Redmond, Wash) and other Campaign materials.

Participants in all 4 groups were asked open-ended questions regarding the problem of AR nationally and in their own institution or practice, barriers and facilitators to preventing AR within each of the 4 Campaign strategies, and what methods would be preferred to reach clinicians about implementing the 4 strategies. Clinicians who had attended the Campaign presentation were asked an additional question about why they chose to attend, and clinicians who had not attended the presentation were asked an additional question about why they did not.

For the quantitative portion of the study, there were 4 hospitals with 117 clinicians who completed the questionnaires. The second part of the questionnaire included 2 questions focused on the 12 Campaign steps. Clinicians were asked to list the 3 steps that they believed were most important and the 3 steps that they believed were least important for preventing AR and to indicate which steps they believed would have the most barriers to implementation. The final part of the questionnaire asked clinicians which of the Campaign materials (pocket cards and posters) they would use and whether they would visit the Campaign Web site.

Data from the questionnaires were entered into Epi Info 2002 (Epidemiology Program Office, Centers for Disease Control and Prevention) and were analyzed using a statistical software program (SPSS 10.0; SPSS Inc, Chicago, Ill). Analyses included descriptive statistics, frequencies, and χ² tests. Within 4 months of the Campaign presentations, 4 focus groups were conducted in Pittsburgh, accounting for the qualitative portion of the study. All of the clinicians who had attended the Campaign presentations at the 4 PRHI hospitals (n=124) and a representative sample of those who had not (n=91) were invited to take part in the focus groups. Two focus groups consisted of clinicians who had attended the Campaign presentation (n=18), and 2 included clinicians who had not (n=10). Each focus group had no more than 9 participants and represented clinicians from all 4 PRHI hospitals. Participants received dinner and an honorarium.

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Each group was facilitated by 1 moderator and was cassette tape recorded, with 1 or 2 additional persons taking notes. The confidentiality of participants and facilities was discussed at the beginning of each group, and transcripts were coded by 2 researchers (T.B.G. and R.L.S.-C.) and aggregated into standardized groups and categories for analysis. In addition, a software program was used to assist with the qualitative data analysis (NUD*IST N6; QSR International, Melbourne, Australia).

### RESULTS

Table 1. Campaign Strategies and Steps, Campaign to Prevent Antimicrobial Resistance, 12-Step Program for Hospitalized Adults, 2002

<table>
<thead>
<tr>
<th>Strategy: Prevent Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1: Vaccinate</td>
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<tr>
<td>Step 2: Get the catheters out</td>
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<table>
<thead>
<tr>
<th>Strategy: Diagnose and Treat Infection Effectively</th>
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</thead>
<tbody>
<tr>
<td>Step 3: Target the pathogen</td>
</tr>
<tr>
<td>Step 4: Access the experts</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategy: Use Antimicrobials Wisely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 5: Practice antimicrobial control</td>
</tr>
<tr>
<td>Step 6: Use local data</td>
</tr>
<tr>
<td>Step 7: Treat infection, not contamination</td>
</tr>
<tr>
<td>Step 8: Treat infection, not colonization</td>
</tr>
<tr>
<td>Step 9: Know when to say “no” to vanco</td>
</tr>
<tr>
<td>Step 10: Stop treatment when infection is cured or unlikely</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategy: Prevent Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 11: Isolate the pathogen</td>
</tr>
<tr>
<td>Step 12: Break the chain of contagion</td>
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</table>

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Clinicians, % (N = 117)

Table 3. Clinician Reporting of Barriers to Implementing Each of the 4 Strategies and 12 Steps, Campaign to Prevent Antimicrobial Resistance, 12-Step Program for Hospitalized Adults: Questionnaire of 4 Hospitals (Pittsburgh Regional Healthcare Initiative, 2002)

BARRIERS TO PREVENTING AR

On the questionnaire, clinicians indicated those Campaign steps that would have the most barriers to implementation and to preventing AR (Table 3). The 3 most frequently indicated steps were “Treat infection, not colonization” (33%, n=41), “Stop treatment when infection is cured or unlikely” (35%, n=41), and “Practice antimicrobial control” (33%, n=39). When viewed by Campaign strategy, “Use antimicrobials wisely” and “Prevent infection” had the highest percentage of steps with barriers to implementation, followed by “Prevent transmission” and then “Diagnose and treat infection effectively” (Table 3).

Clinicians in the focus groups were similarly asked to describe the barriers to preventing AR and implementing the 4 Campaign strategies, and they indicated 11 additional categories of barriers in their discussion. The most frequently cited barrier was the culture of health care (75%, n=21), which was characterized by physicians’ tendency to overtreat infections, a lack of accountability among clinicians to each other and to the patient, and noncompliance with infection control precautions. Referring to the tendency to overtreat, one clinician stated, “There is a very strong impetus to use broad spectrum antibiotics. And then, perhaps, if there is something, and the [microbiologic] culture comes back and you find out that there is resistance to the antibiotic that the patient is on, there is this tendency to just keep the patient on, if it is just for another couple of days, why switch?”

The relationship between a culture of noncompliance and a lack of accountability to the patient was summarized as follows: “It is that culture and that mentality of disposable, there is always a quick fix. . . . You can preach gown and glove, but ‘oh, I am just running in for two seconds,’ and there is not a lot of commitment to the patient.”

Thirteen clinicians (46%) in the focus groups cited a lack of knowledge and education regarding antimicrobials (response rate, 94.4%). Clinicians indicated their position as nurse (47.9%), physician (33.3%), microbiologist (8.5%), pharmacist (6.0%), or other (4.3%). For the qualitative analysis, 28 clinicians (18 who had attended the Campaign presentation and 10 who had not) participated in 4 focus groups. The 2 focus groups of clinicians who had attended the presentation consisted of 10 nurses, 6 physicians, and 2 microbiologists. The 2 focus groups of clinicians who had not attended the presentation consisted of 7 nurses, 2 physicians, and 1 pharmacist.

PERCEPTIONS OF THE PROBLEM OF AR

As measured by the questionnaire, clinicians’ perceptions of the problem of AR nationally, in their own institution, and in their own practice varied (Table 2); 94.8% of clinicians agreed or strongly agreed that AR was a problem nationally, 77.0% in their own institution, and 65.3% in their own practice. Clinicians were significantly more likely to perceive that AR was a problem nationally vs in their own institution (P=.001) and nationally vs in their own practice (P=.002). Clinicians also were significantly more likely to perceive that AR was a problem in their institution vs in their practice (P<.001).

Clinicians’ perceptions of the problem of AR also varied among clinicians in the focus groups. When asked whether they believed that AR was a problem nationally, 26 clinicians (93%) said “yes.” The remaining 2 clinicians (7%) indicated that they did not know whether it was a problem nationally; none of the clinicians said “no.” In contrast, when asked about their own institution or practice, only 13 clinicians (46%) agreed that it was a problem. The remaining 15 clinicians (54%) were undecided and discussed AR as being present but not a problem in their institution (“I do not think what we see is out of the ordinary.”), as a problem that emerges in the community and then enters their hospital (“I know we have admissions of patients, and I think, where they would identify them and isolate them. . . . So there is a population of patients that come in with resistant pathogens.”), or as a problem at other institutions (“At our community hospital, I don’t think that we have a problem as maybe a larger city or tertiary care [would].”).

Data are given as percentages of perceptions of 117 clinicians.

Table 2. Clinicians’ Perceptions of the Problem of Antimicrobial Resistance, Campaign to Prevent Antimicrobial Resistance, 12-Step Program for Hospitalized Adults: Questionnaire of 4 Hospitals (Pittsburgh Regional Healthcare Initiative, 2002)*

<table>
<thead>
<tr>
<th>Response</th>
<th>Antimicrobial Resistance Is a Problem</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Nationally</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>68.1</td>
</tr>
<tr>
<td>Agree</td>
<td>26.7</td>
</tr>
<tr>
<td>Neither agree nor disagree</td>
<td>1.7</td>
</tr>
<tr>
<td>Disagree</td>
<td>0.9</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>2.6</td>
</tr>
</tbody>
</table>

*Data are given as percentages of perceptions of 117 clinicians.
brial use and resistance as the next most frequent barrier. Ten clinicians (36%) indicated the nursing shortage as a barrier to preventing AR, and 9 (32%) indicated a lack of time as the next most frequently cited barrier: “Time is also an issue... the nursing staff has more and more responsibilities all the time, and they need to prioritize what they have to do, and it is very time consuming to practice infection control.” Eight clinicians (29%) cited the social demand for antibiotic agents as another common barrier to preventing AR: “I think they (patients) feel undertreated or cheated if they do not have a prescription for either a pain medication or an antibiotic after surgery.”

Other barriers to preventing AR discussed in the focus groups included the legal liability of not treating a patient with an antibiotic; lack of compensation from insurance companies for prevention education and from hospitals for necessary resources; prohibitive regulations, such as building codes that do not allow isolation carts in hospital hallways; the transfer of patients with resistant pathogens into the hospital from other facilities and nursing homes; and pressure from pharmaceutical companies to use certain antibiotic agents.

FACILITATORS TO PREVENTING AR

On the questionnaire, clinicians indicated the 3 Campaign steps that they believed were most important and the 3 steps that they believed were least important in facilitating the prevention of AR (Table 4). The steps “Vaccinate” (44%, n = 52), “Practice antimicrobial control” (44%, n = 52), and “Get the catheters out” (37%, n = 43) were the 3 most commonly cited steps as most important to preventing AR. “Use local data” (32%, n = 37), “Vaccinate” (21%, n = 24), and “Stop treatment when infection is cured or unlikely” (21%, n = 24) were the 3 most commonly cited steps as least important to preventing AR. When analyzed by Campaign strategy, the first 2 strategies, “Prevent infection” and “Diagnose and treat infection effectively,” had the highest percentage of steps considered most important to preventing AR, and the second 2 strategies, “Use antimicrobials wisely” and “Prevent transmission,” had the lowest percentage of steps.

Clinicians in the focus groups similarly were presented with the 4 Campaign strategies and were asked to determine which were most important for preventing AR. Twenty-one clinicians (75%) indicated that all 4 Campaign strategies were equally important: “I do not think there is any one particular one that is going to solve the problem. I think that all four of them have to be addressed at the same time.” Three clinicians (11%) indicated “Prevent transmission” as the primary strategy, 2 (7%) indicated “Prevent infection,” and 2 (7%) indicated “Use antimicrobials wisely”; none of the 28 clinicians indicated “Diagnose and treat infection effectively” as a primary strategy.

When asked about what facilitators they would recommend for implementing the 4 Campaign strategies, clinicians in the focus groups named 16 additional facilitators. Twenty-three clinicians (82%) suggested education of the public and clinicians, by peers and key opinion leaders, as a facilitator for preventing AR. Eleven clinicians (39%) indicated the use of information technology, such as electronic physician order entry or handheld computer devices, as another facilitator for preventing AR: “It would be great to have access to all that information at just your fingertips.” The third most commonly cited facilitator, infectious disease consults, was indicated by 8 clinicians (29%).

Other facilitators suggested by clinicians in the focus groups included restricting antibiotic drug prescriptions, as through the use of stop orders; limiting external forces, such as pharmaceutical companies in hospitals and antimicrobial use in agriculture; negative and positive reinforcements for following infection control procedures and appropriate use of antibiotic agents; increased federal reimbursement for prevention efforts; antibiotic management programs; accessing local data; and making insurance companies accountable.

REACHING CLINICIANS ON THE PREVENTION OF AR

Of the 64 clinicians who completed the third page of the questionnaire regarding Campaign materials, 48 (75%) indicated that they would carry the pocket card and 42 (66%) that they would view the Web site. Of 27 clinicians (42%) who indicated that they would hang the Campaign poster, 8 (30%) would hang it in their office, 6 (22%) in the waiting area, 5 (19%) in the break room, 3 (11%) in a conference room, and 2 (7%) in a front desk or nurses’ station area. Other areas for hanging the poster included in one’s department, dictation areas, resident call station area. Other areas for hanging the poster are the laboratory, medical staff offices, the pharmacy, and restrooms.
Clinicians in the focus groups discussed a variety of other ways for reaching clinicians, suggesting 22 different types of materials or methods for influencing clinicians’ behaviors and practices regarding AR. Fourteen clinicians (50%) specified computer programs, including handheld devices, software, data abstractors, and electronic mail reminders. Eight clinicians (29%) cited posters, and 7 (25%) cited local data such as hospital antibiograms. Six clinicians (21%) suggested clinical pathways, and 6 (21%) suggested a presentation or written talk as a means of increasing clinician awareness of AR.

Other materials and methods for reaching clinicians on the topic of AR included Web sites or the Internet; continuing medical education; fliers, pamphlets, or fact sheets; television, magazine, or highway billboard announcements; videos; professional society meetings; and health care examples or case studies.

**REASONS FOR ATTENDING AND NOT ATTENDING THE CAMPAIGN PRESENTATION**

Clinicians in the focus groups were asked about why they did or did not attend the Campaign presentation at their hospital. Of the 18 clinicians who attended, 13 (72%) attended to learn more for their job, 4 (22%) were pressured to attend by a peer or because their attendance was mandated (although 2 of the 4 clinicians also indicated that they attended to learn more for their job), and 3 (17%) attended because they were interested and wished to learn more about the topic in general. Clinicians suggested that future presentations occur at quarterly staff meetings, be made necessary for privileges or incur a fine for those who do not attend, or be worth continuing medical education credit.

Of the 10 clinicians who did not attend the presentation, 6 did not remember the presentation or being invited and 4 could not attend, primarily because of personnel shortages. These clinicians were asked the additional question of what would have influenced them to attend such a session, to which 4 suggested a personal invite; 3 incentives such as food, gifts, or money; 3 a personal interest in the topic; 2 a convenient time of day or year; and 1 each responded if it was mandatory, if they received an agenda with a time commitment for the presentation, or if there was publicity.

**COMMENT**

Antimicrobial resistance is an emerging public health problem, and resistant pathogens currently exist for which no first-line treatment is effective. The rapid and sharp increase in AR has been primarily attributed to inappropriate antimicrobial use and noncompliance with infection control precautions. The Campaign to Prevent Antimicrobial Resistance in Healthcare Settings affords a framework for providing clinicians with information to prevent AR and for motivating clinicians to take action against AR. The Campaign translates evidence-based guidelines and recommendations into simple action steps that are easy for clinicians to recall and follow. Although clinicians in this study perceived the problem of AR to be greater nationally than in their own institution or practice, they also identified several key barriers and facilitators to preventing AR and a variety of materials and methods for reaching clinicians about the problem.

Clinicians’ perception that AR is a greater problem nationally than in their own institution or practice was present in the quantitative and qualitative analyses. Although clinicians in the focus groups almost unanimously agreed that it was a problem nationally, the perception that the problem was not in their own institution or practice remained pervasive. One clinician stated, “I have this feeling it is not as severe at our institution in the fact that we are sort of geographically isolated... and the number of VRE [vancomycin-resistant enterococci] or MRSA is very limited. So, I think our hospital might be doing a little better than other hospitals across the country.” However, institution-specific AR data from the 4 PRHI hospitals in this study revealed that, for example, for MRSA, 37% to 63% of *S aureus* isolates in their hospitals were resistant to methicillin, and all clinicians had access to these data through their local antibiograms. Perceptions of AR as different in one’s institution vs in one’s practice though can be subtle: “I do hear the students talk more about MRSA or VRE [vancomycin-resistant enterococci]. . . . So, I know that they have a lot of patients that are apparently in the hospital that have it. I personally do not take care of any.”

The perception that AR is less of a problem in one’s institution or practice versus nationally is similar to that in a study by Wester et al in which 87% of respondents thought that AR was a very important national problem but only 55% perceived it to be a very important problem in their own institution. This lack of perceived susceptibility among clinicians may account for their non-compliance with infection control precautions and their misuse of antimicrobials. The percentage of clinicians in this study who neither agreed nor disagreed that AR was a problem on the questionnaire increased from 2% nationally to 18% in their own institution and to 22% in their own practice, also demonstrating a lack of awareness and understanding regarding the problem. Until clinicians perceive their personal practice of medicine and their patients as being susceptible to AR, they will lack the motivation needed to change their practice behaviors: “Maybe if we could just make sure every member of the staff understood what happens down the road with these patients [with resistant pathogens], maybe two weeks, three weeks, four weeks later... [they would take the appropriate steps to preventing it]. . . .”

If clinicians perceive the problem of AR as relevant to their own practice of medicine, they may be more likely to overcome the barriers to preventing it. Clinicians in this study identified a range of barriers to preventing AR, most of which involved antimicrobial use. On the questionnaire, the Campaign steps indicated as having the most barriers to implementation (“Treat infection, not colonization,” “Stop treatment when infection is cured or unlikely,” and “Practice antimicrobial control”) were all within the Campaign strategy “Use antimicrobials wisely.” This finding correlates to the focus group discussion that the culture of health care to overtreat patients—a misperception that more is better—whether by treating colonization rather than infection or by using broad-
spectrum antimicrobials—is a primary barrier to preventing AR: “I think from the provider’s perspective, there is a desire to not have a bad outcome. That is why, when a sick patient walks in the door, you want to cover everything, once you choose an antibiotic that has a very wide spectrum for various reasons, whether legal or whatever, you do not want to miss something that is treatable.”

Additional barriers to preventing AR that were mentioned in the focus groups included a lack of or inappropriate education on AR, particularly on the use of antimicrobials, and following incorrect examples of fellow clinicians. Clinicians in the focus groups also revealed the barriers of time and the nursing shortage, which mutually impact the prevention of AR, particularly in preventing transmission. The nursing shortage has mandated that nurses take care of more patients, and when dividing their time among many patients, nurses may be less prone to follow infection control precautions. The problems of the nursing shortage and decreased time are compounded by a lack of accountability in the health care culture, where workers cannot or will not take the time to don a gown or gloves or to practice hand hygiene.

When discussing facilitators to preventing AR, however, clinicians focused less on overcoming barriers to individual practice and more on external means of preventing AR, such as education of the public and other clinicians, either by peer education or via an opinion leader; limiting the influence of pharmaceutical companies in hospitals; limiting antimicrobials in agriculture; and increasing federal reimbursement to hospitals for prevention efforts. Other facilitators included institutional or organizational factors for preventing AR, such as information technology (eg, electronic physician order entry), restrictions on cultures, and positive and negative reinforcements for encouraging clinicians to prevent AR. The focus on external and institutional methods for preventing AR illustrates a perception among clinicians that their individual practice behaviors may not directly affect AR as much as external and institutional factors over which they may perceive limited control.

In addition to their discussion of facilitators to preventing AR, clinicians identified on the questionnaire the 3 most important and least important Campaign steps for preventing AR. “Vaccinate,” within the strategy of “Prevent infection,” was in the top 3 most important and least important steps. This finding illuminates a misunderstanding of the importance of vaccinating hospitalized patients for influenza and pneumococcus as a way to prevent AR. As explained by clinicians in the focus groups, “If we prevent it, we do not have to worry about what antibiotics we are using and the transmission of it.”

All of the steps indicated on the questionnaire as most and least important were within the Campaign strategies of “Prevent infection” and “Use antimicrobials wisely.” As data from the questionnaire also listed these 2 strategies as having the most action steps with barriers to implementation, clinicians may be split in deciding how important certain steps are in preventing AR given the barriers and challenges to accomplishing them. Focus groups similarly identified several facilitators for preventing AR that fell within the strategy of “Use antimicrobials wisely,” such as electronic physician order entry and limiting the influence of pharmaceutical companies in hospitals. Although clinicians in the focus groups also indicated “Prevent transmission” as the primary Campaign strategy for preventing AR, noncompliance with infection control precautions was cited as a primary barrier to preventing transmission. Overall, clinicians in this study focused on the strategies “Prevent infection,” “Use antimicrobials wisely,” and “Prevent transmission” and tended to disregard the strategy “Diagnose and treat infection effectively,” which was neither among the most or least important steps with the highest frequencies nor indicated as a primary Campaign strategy for preventing AR.

Despite the perception among several clinicians that certain Campaign steps or strategies are more important than others, clinicians should incorporate all 4 strategies into their practice of medicine to make a substantial impact in preventing future cases of AR. Clinicians in the focus groups overwhelmingly agreed that all 4 strategies were important for preventing the problem. As articulated by one clinician, “Every person that comes into your facility is at a crossroads, in their care and in their health. You are talking about four avenues . . . and if you do not have all four players playing on a team, when you are talking health care, from the time a person walks in to the time they go home . . . [they] could develop an infection, could develop resistance.” By shifting the focus from a single specific strategy to all 4 prevention strategies working together, the Campaign is a relevant and useful framework for helping clinicians prevent AR.

To reach clinicians on the topic of AR, our results suggest that an array of methods be used, including educational materials and constant reminders, such as posters, which provide simple, preventive messages. Other venues for reaching clinicians include professional society meetings and educational presentations where clinicians are exposed to the scientific evidence that explains how prevalent AR is, how severe its consequences are, and how clinicians can effect change in their personal practice of medicine. Resources such as computer tracking systems and electronic physician order entry, clinical pathways, and local antibiograms could further facilitate clinicians’ ability to prevent AR and may also serve as ways to motivate clinician practice change toward preventing AR among their patients.

As a method of reaching clinicians regarding AR in health care settings, it is more likely that clinicians will attend a presentation or educational intervention that is mandated or offered for continuing medical education credit. Because clinicians in this study were more likely to come to a presentation if it was relevant to their job or interest area, it will be necessary that advertisements or invitations to similar presentations explain the relevance and importance of AR to clinicians’ jobs, personal interest areas, and patients (“Because you cannot go to everything . . . It is mainly how applicable it is to what I do.”).

Data from this study were gathered using qualitative and quantitative methods to gain a broader perspective on clinicians’ perceptions of AR and to validate quantitative findings with qualitative data. Because most
clinchens assessed in this study were nurses and physicians, more data from pharmacists, physician assistants, and other clinical personnel may be valuable for learning how best to reach all clinicians on this topic. Further examination for potential differences in perceptions within each of these groups, such as between attendings and housestaff or between registered nurses and licensed practical nurses, may also be valuable. In addition, although 4 different PRHI hospitals were sampled, from rural to urban and from small to large, data may not necessarily represent the perceptions of clinicians in other parts of the country. However, this was the first multicenter study in a region of health care facilities to assess clinicians’ perceptions of AR, barriers and facilitators to preventing AR, and how best to reach clinicians on this topic.

Antimicrobial resistance continues to be a growing problem for all clinicians nationally, in their institutions, and in their practices. Antimicrobial resistance accounts for numerous social and economic costs, including loss of life, decreased quality of life, and an estimated $100 million to $30 billion annually to care for patients with resistant pathogens. A multifaceted problem such as that posed by AR requires a multifaceted solution. When viewing the 4 Campaign strategies and 12 action steps, it is evident that no single isolated step or strategy will prevent this complex problem. By reaching clinicians and raising clinicians’ awareness about the risks for AR, clinicians may better perceive their own practice of medicine and their own patients as being susceptible to AR. By affecting clinicians’ perceptions of the problem, frameworks such as the Campaign to Prevent Antimicrobial Resistance in Healthcare Settings may motivate clinicians to take action to overcome the barriers to preventing AR, embrace the facilitators that help them prevent AR, and ultimately change their personal practice of medicine to prevent AR and ensure patient safety.

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