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Understanding Staff Perceptions about *Klebsiella pneumoniae* Carbapenemase–Producing Enterobacteriaceae Control Efforts in Chicago Long-Term Acute Care Hospitals

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Abstract

OBJECTIVE.—To identify differences in organizational culture and better understand motivators to implementation of a bundle intervention to control *Klebsiella pneumoniae* carbapenemase–producing Enterobacteriaceae (KPC).

DESIGN.—Mixed-methods study.

SETTING.—Four long-term acute care hospitals (LTACHs) in Chicago.

PARTICIPANTS.—LTACH staff across 3 strata of employees (administration, midlevel management, and frontline clinical workers).

METHODS.—Qualitative interviews or focus groups and completion of a quantitative questionnaire.

RESULTS.—Eighty employees (frontline, 72.5%; midlevel, 17.5%; administration, 10%) completed surveys and participated in qualitative discussions in August 2012. Although 82.3% of respondents felt that quality improvement was a priority at their LTACH, there were statistically significant differences in organizational culture between staff strata, with administrative-level having higher organizational culture scores (ie, more favorable responses) than midlevel or frontline staff. When asked to rank the success of the KPC control program, mean response was

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8.0 (95% confidence interval, 7.6–8.5), indicating a high level of agreement with the perception that the program was a success. Patient safety and personal safety were reported most often as personal motivators for intervention adherence. The most convergent theme related to prevention across groups was that proper hand hygiene is vital to prevention of KPC transmission.

CONCLUSIONS.—Despite differences in organizational culture across 3 strata of LTACH employees, the high degree of convergence in motivation, understanding, and beliefs related to implementation of a KPC control bundle suggests that all levels of staff may be able to align perspectives when faced with a key infection control problem and quality improvement initiative.

Klebsiella pneumoniae carbapenemase–producing Enterobacteriaceae (KPC) can spread rapidly within healthcare facilities.¹⁻⁵ Infections due to these pathogens are associated with high attributable mortality.⁶ Control of KPC is a public health priority.⁷

In the United States, long-term acute care hospitals (LTACHs) are an important reservoir of patients colonized with KPC.⁸ LTACH patient characteristics (ie, multiple complex medical problems, high rates of invasive medical device use, frequent transfers to and from other acute and long-term care facilities) and exposure to numerous courses of antibiotics contribute to high rates of colonization and infection with multidrug-resistant organisms (MDROs) such as KPC. In Chicago, the prevalence of KPC-positive patients is approximately 30.4% in LTACHs.⁹

Control of KPC in LTACHs has usually relied on implementation of different infection control interventions introduced as a bundle.^{10,11} Examples of interventions include improvement in healthcare personnel hand hygiene adherence, enhanced environmental cleaning efforts, and establishment of KPC-positive patient cohorts.^{10,11} Most of the interventions require high levels of healthcare worker cooperation for success.¹²⁻¹⁹ Hospital organizational culture has been shown to influence attitudes and practices during quality improvement initiatives aimed at control of other MDROs, such as methicillin-resistant *Staphylococcus aureus*.^{20,21} Organizational culture is defined as the assumptions, values, norms, and behaviors that can help or hinder an organization's ability to achieve goals and to implement sustainable quality improvement efforts.²⁰⁻²⁵ To our knowledge, the organizational culture of LTACHs has not been studied.

An infection control bundle was introduced to 4 freestanding LTACHs in Chicago with the goal of reducing KPC colonization and infection. Bundled interventions included patient rectal swab cultures to screen for KPC carriage on admission and biweekly, geographic separation of KPC-positive and KPC-negative patients; increased monitoring of employee hand hygiene and personal protective equipment use; and daily skin cleansing of all patients with 2% chlorhexidine gluconate–impregnated cloths (Sage).

As LTACHs began introducing the infection control bundle, it became apparent that each facility and its staff members had a distinct organizational culture. We conducted a mixed-methods evaluation to identify differences in organizational culture among facilities and across staff strata in each of the 4 LTACHs and to better understand motivators to implementation of the KPC bundle.

METHODS

Staff across 3 strata of employees (frontline staff, midlevel management, and high-level administration) from 4 LTACHs that had introduced the bundled interventions were invited to participate in interviews or focus group discussions, using a previously evaluated mixed-methods framework.^{21,26} The administrative group consisted of the chief executive officer and chief clinical officer. The midlevel management group consisted of nurse managers and the facility infection preventionist. Frontline staff included those employees who provide direct patient care, such as registered nurses, certified nursing assistants, respiratory therapists, and physical therapists.

Administration and infection preventionists were interviewed individually except at 1 LTACH, where the chief executive officer and chief clinical officer were interviewed together. Because of the number of nurse managers and frontline staff at each facility, focus group discussions were more feasible than individual interviews. A convenience sample of nurse managers and frontline staff participated in separate focus groups with no more than 10 participants in each group. The moderator (R.D.L.) conducted each interview and led each focus group discussion using the same structured, 10-question script with an assistant (S.B.W.) who took notes. Interviews and focus group discussions lasted approximately 30 minutes and were audio recorded and transcribed upon completion. Participants were advised that they were being audio recorded but that their identities would remain confidential. In order to encourage participation, frontline staff who participated in focus groups were provided breakfast or refreshments; participation was voluntary, and no participant received monetary compensation.

Participants also completed a 2-part quantitative questionnaire immediately prior to their interview or focus group discussion. Part 1 consisted of 14 items on a 5-point Likert scale (1, strongly disagree; 5, strongly agree) that measured attitudes and beliefs about the KPC control program and quality improvement at the facility. There was also a question about the success of implementation of the KPC project at the facility that was scored on a 10-point scale (1, not at all successful; 10, very successful). Part 2 asked questions related to organizational culture and was adapted from a validated questionnaire.^{20,21,25} The organizational culture scale consisted of 18 questions on the 5-point Likert scale described above. A total organizational culture score was created by summing an individual's responses to all organizational culture questions, yielding a possible score range of 18–90. A higher total organizational culture score indicates a better, more positive organizational culture.

We analyzed participant qualitative responses from the individual interviews and focus groups, using an immersion and crystallization technique.²⁷ Individual responses were coded into themes for each question and aggregated on an interview/group level per question. An Excel database (Microsoft) was developed that listed thematic responses from the interviews and focus group discussions as well as direct quotes that supported each theme. After all themes were identified, major themes for each question were tallied overall and then by employee strata. Convergence and divergence across qualitative groups (ie, results of individual interviews and focus groups) and strata were examined for trends.

Responses for the quantitative questionnaire were analyzed using SPSS 18.0 to calculate univariate statistics, 1-way ANOVA, and Bonferroni pairwise comparisons.

RESULTS

Participants

A total of 80 staff completed the quantitative survey and participated in 32 qualitative groups—either one-on-one interviews (12) or focus groups (20)—in August 2012. Depending on the LTACH, assessments were conducted between 2 and 10 months after introduction of the KPC bundle intervention. Frontline staff comprised 72.5% of participants, followed by midlevel management (17.5%) and administration (10%). Frontline staff included 14 nurses, 17 certified nursing assistants, 13 respiratory therapists, and 14 physical therapists. Midlevel management consisted of 14 nurse managers and the infection preventionist from each facility. All administrative personnel (chief executive officer, chief clinical officer) from each LTACH participated. Median length of employment for participants was 6.8 (range, 0.8–23) years. Frontline staff participants had worked at each specific LTACH for a median of 6.3 (range, 0.1–21) years, midlevel management for a median of 12.0 (range, 1–23) years, and administration for a median of 3.3 (range, 0.5–10) years. Midlevel management were employed significantly longer than administration ($P = .048$); frontline staff were employed longer than the administration and shorter than midlevel management, but these differences were not statistically significant ($P = .55$ and $.18$, respectively).

Participants' Perceptions of Quality Improvement and Organizational Culture

Overall, 82.3% of respondents felt that quality improvement was a priority at their LTACH, with 90% of respondents feeling that their work had an impact on quality improvement (Table 1). Frontline staff viewed quality improvement differently than did other staff, believing less strongly than either the administration or midlevel staff that quality improvement was a priority and that their work affected quality improvement. The administration agreed more strongly than frontline staff that quality improvement goals were set at the senior level. Frontline and midlevel staff were each significantly less satisfied with their jobs than was administration; frontline and midlevel staff did not differ significantly from each other (Table 1).

There was a statistically significant difference in the mean total organizational culture scores between frontline staff and the administration (Table 2). Administration had higher organizational culture scores ($P = .044$), reflecting a more positive view of the facility's organizational culture. There were no statistically significant differences between the administration and midlevel management ($P = .55$) or between midlevel management and frontline staff ($P = .63$). When mean total organizational culture scores of each of the 4 LTACHs were compared with one another, no statistically significant differences were detected (data not shown).

Participants' Perceptions of KPC Control Interventions

When asked to rank the overall success of implementing the KPC control program at each facility, the mean response was 8.0 (95% confidence interval [CI], 7.6–8.5) on a scale of 1 to

10, indicating a high level of agreement with the perception that the program was a success, with a trend toward differences among employee strata ($P = .052$). Mean responses of administrative staff were highest (9.2 [95% CI, 8.4–10]), followed by midlevel management (8.6 [95% CI, 7.9–9.3]) and frontline staff (7.7 [95% CI, 7.2–8.3]), but pairwise comparisons of mean differences between employee strata were not statistically significant. When responses to this question were compared across LTACHs, mean responses ranged from 7.1 (95% CI, 5.9–8.2) to 8.7 (95% CI, 8.2–9.2; $P = .023$), indicating small but statistically significant differences in perception of the success of the KPC control program among the 4 facilities. No other significant differences were detected when responses to the quantitative questionnaire were compared across the 4 LTACHs.

Overall, all levels of staff felt similarly about the KPC control interventions, with more than 90% of participants agreeing or strongly agreeing that the KPC control interventions were useful to their hospital, that leadership supported the hospital's involvement with the project (85% agreed), and that frontline staff were aware of the interventions (92.5% agreed) and believed the interventions to be important (86.3% agreed). Differences seen across strata of employment generally followed the pattern that administration agreed most strongly, followed by midlevel management and then frontline staff; however, often these differences were not statistically significant (Table 1). When asked whether they agreed that the KPC control interventions matched the organization's priorities, frontline staff agreed significantly less than the administration ($P = .036$). Across all employee strata in the qualitative interviews and focus groups, when asked about the mode of KPC acquisition, primary responses were focused on contact as a cause—specifically patient contact—and lack of hand hygiene. Another common theme was patients' exposure to healthcare facilities, although the type of exposure highlighted differed by employee strata. The most common responses by employee strata in the qualitative interviews and focus groups are shown in Table 3. There were no notable qualitative differences found among facilities during the interviews and focus groups.

When asked what is the one most effective way to prevent the spread of KPC, all 32 qualitative groups responded that proper hand hygiene was the one most effective way to prevent the spread of KPC; 23 groups felt that proper use of personal protective equipment also was effective. One participant from midlevel management also focused on overuse of antibiotics, responding, "Physicians have to pay attention and not just give antibiotics like they're M&Ms."

Respondents were asked about motivators to prevent the spread of KPC, to which the most common response across interviews and focus groups was overwhelmingly patient safety, with personal safety as a motivator as the second most frequent response followed by prevention. Beyond patient and personal safety, administration focused primarily on financial impact and community awareness as motivators. When asked what motivates your colleagues to prevent the spread of KPC, overall responses were similar to those reported above.

When asked about positive effects of the KPC control program at the facility as well as positive effects on other MDROs, the overall most common response was increased and

better cohorting of patients with respect to MDROs and isolation requirements. Other less frequent responses included decreasing the spread of KPC, reduction in other MDROs, and increased awareness of KPC. One midlevel manager said, “It has limited the new cases of KPC,” while a member of administration responded, “We have seen a decrease in all MDROs [like vancomycin-resistant *Enterococcus*, methicillin-resistant *Staphylococcus aureus*] ... everything is better.”

When asked about negative effects of the KPC control program, the most common response across interviews and focus groups was the perception of patient or family dissatisfaction with the chlorhexidine gluconate cloths (eg, complaints of perceived allergy or sensitivity to the cloths, preference for soap and water bathing). Overall, there were very few perceived negative effects from staff; however, both frontline staff and midlevel managers discussed the difficulty in maintaining a cohort of KPC-positive patients, and frontline staff mentioned lack of communication about patient results and data feedback from implementation of the KPC bundle.

Respondents were asked their opinions about the long-term effect of the KPC control program at their facility and in the Chicago area. In relation to individual facilities, prevention and control of KPC spread was the most common response overall from respondents. Better patient outcomes were also mentioned across all strata of participants. Administration also reported that there would be an increase in the evidence base and a positive financial impact. Midlevel managers reported that 1 effect of the KPC control program would be the continuation of the actual bundle interventions. In relation to the Chicago area, the overall most common response across interviews and focus groups was that prevention and control of KPC would be the long-term effect. The second most common response was an increased awareness and knowledge about KPC, followed by serving as a model or example for control efforts within the Chicago region.

When asked for 1 piece of advice regarding prevention and control of KPC at their facility, the most common response across interviews and focus groups was that proper performance of hand hygiene was necessary to prevent the spread of pathogens such as KPC. The importance of increased awareness of KPC and the favorable effect of bathing patients with chlorhexidine gluconate cloths were also mentioned by the administration. Less frequently reported responses from midlevel managers included the need for proper environmental cleaning, for screening and isolation of patients to identify those who are KPC positive, and for changes in patient transporting practices. Similarly, the use of chlorhexidine gluconate cloths and screening and isolating KPC-positive patients were advice mentioned by frontline staff.

DISCUSSION

This mixed-methods evaluation was conducted to better understand and assess the differences across strata of healthcare employees who were involved in implementation of a KPC control program in 4 Chicago LTACHs.²¹ Statistically significant differences were found to the quantitative questionnaire responses primarily between the administration and frontline staff, with lesser differences identified between midlevel management and frontline

staff and the administration and midlevel groups. For example, it is evident that there is a significantly different view of organizational culture between the administration and the frontline staff. However, the concordance of responses across the strata related to the KPC control interventions suggests that all levels of staff are in agreement when faced with what all view as a key infection control problem and quality improvement initiative. In part, this may reflect the tailoring of education about the interventions to specific employee types. This tailored approach—coupled with an emphasis on strata-specific motivators—may be useful for engaging staff in new infection control and quality improvement efforts.

In this evaluation, patient and personal safety were primary motivators reported across all groups in the qualitative discussions. Overarching themes of hand hygiene and proper personal protective equipment use as well as improved prevention and patient outcomes were reiterated through all levels of employment and convergent across interviews and focus groups. The convergence seen throughout the interviews and focus groups as well as strata may indicate that a focused, well-messaged prevention intervention bundle may overcome differences in organizational culture. It is, however, important to note where there is divergence between groups and then to modify messaging on the basis of those differences. In this study, for example, administration cited concepts integral to running a business, such as finances and relationships with other healthcare facilities, while midlevel managers and frontline staff emphasized a need for increased awareness of KPC and better communication among staff to facilitate translation of knowledge into action. Defining motivational messages for each strata could be informed by these differences that are not unique to LTACHs and are consistent with those found in evaluations of acute care hospitals as well.^{21,26}

One important concept that this study illuminated was the potential for disconnect between knowledge, perceptions, and action. Although there were differences seen across groups and there continues to be a need for increased education and communication, the results of this study emphasize an overarching understanding of the importance of proper infection control measures and general agreement that the KPC control interventions were important and useful. These perceptions do not, however, always dictate practice. As an example, observed hand hygiene rates in these facilities ranged from 40% to 94% over the course of the study (data not shown), even though every interview and focus group identified hand hygiene as the most important way to prevent transmission of KPC. Thus, while education and comprehension are important, more is needed to translate that understanding into sustainable changes in behavior.

This study should be interpreted in light of its limitations. First, each participant self-reported answers to both the qualitative and quantitative aspects of the evaluation. Additionally, the sample of participants included was not random, since only those LTACH staff present on the day of each focus group were eligible to participate. Furthermore, introduction of the bundle intervention to each LTACH was staggered over time, so that each facility had a different length of participation in the KPC control program prior to completing this evaluation. The different lengths of exposure to the intervention may have affected employees' perceptions of the program and their ability to evaluate its success and sustainability; however, we found no appreciable qualitative or quantitative

differences between facilities. In addition, lengths of employment ranged greatly both within employee strata and between strata. This highlights the need for continued education and enhanced awareness at all levels to ensure that both current as well as new employees are knowledgeable and able to contribute to infection prevention programs such as the KPC interventions. Finally, antibiotic stewardship was not a purview of our bundle, so we did not assess the participants' perceptions of physician prescribing, although 1 midlevel manager offered an opinion about profligate use of antibiotics.

In conclusion, we found differences in perceptions of organizational culture between administration (higher organizational culture scores) and frontline staff (lower organizational culture scores) at 4 different LTACHs. However, when practical issues related to a real and present hazard—spread of KPC—were discussed, the agreement across the 3 strata of staff about infection control approaches and effects was striking, suggesting that infection control and quality improvement efforts can be strengthened by a focus on common threats. Going forward, it will be important to assess whether such cooperation can be maintained by using stratum-specific motivators.

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Proportion of Participants Who Agreed or Strongly Agreed with Statements about Quality Improvement and the *Klebsiella pneumoniae* Carbapenemase–Producing Enterobacteriaceae (KPC) Control Intervention by Employee Type

TABLE 1.

Statements	Overall (n = 80)	Administration (n = 8)	Management (n = 14)	Frontline (n = 58)	P	Post hoc direction ^a
Quality improvement is a priority at my hospital.	82.3	100	100	75.4	.003	A > F, M > F
My work impacts quality improvement in my hospital.	90	100	100	86.2	.006	A > F, M > F
I have an impact on my hospital's quality improvement work.	88.8	100	100	84.5	.027	NA ^b
I am satisfied with my job at this hospital.	77.2	100	76.9	74.1	.011	A > M, A > F
Quality improvement goals at my hospital are set at the senior level.	61	87.5	57.1	58.2	.018	A > F
Quality improvement goals at my hospital are set at the patient unit level.	64.6	87.5	64.3	61.4	.057	
Too much attention is placed on quality improvement at this hospital.	26.3	12.5	28.6	27.6	.085	
Administration supports my hospital's involvement with the KPC control interventions.	85	100	92.9	81	.053	
Frontline staff believes the KPC control interventions are important.	86.3	87.5	85.7	86.2	.963	
Frontline staff is aware of the KPC control interventions.	92.5	87.5	100	91.4	.461	
Time is allocated to work on the KPC control interventions.	73.1	75	71.4	73.2	.587	
The KPC control interventions implemented at my hospital match our organizational priorities.	80	100	85.7	75.9	.038	A > F
The KPC control interventions implemented at my hospital are sustainable.	82.3	100	92.9	77.2	.065	
The KPC control intervention is useful to my hospital.	91.9	100	92.9	89.5	.125	

NOTE. Data are %, unless otherwise indicated. A, administration; F, frontline staff; M, midlevel management; NA, not applicable.

^aBonferroni pairwise comparison results ($P < .05$).

^bBonferroni pairwise test did not detect a statistically significant difference between the groups.

TABLE 2.
Organizational Culture Score with ANOVA and Bonferroni Post Hoc Test for Direction

Staff	Mean score	SD	95% CI	F	df	P	Post hoc direction ^a
Total (<i>n</i> = 79) ^b	62.6	10.6	60.2–65.0	3.524	2,76	.034	A > F
Administration (<i>n</i> = 7)	71.3	3.4	68.2–74.4				
Midlevel management (<i>n</i> = 14)	64.9	10.2	59.0–70.7				
Frontline staff (<i>n</i> = 58)	61.0	10.8	58.1–63.8				

NOTE. A, Administration; CI, confidence interval; F, Frontline staff; SD, standard deviation;

^aBonferroni pairwise comparison results ($P < .05$).

^bOne administrator did not complete the organizational culture score section.

TABLE 3.

Most Common Thematic Responses from Qualitative Interviews and Focus Groups of Long-Term Acute Care Hospital (LTACH) Staff by Employee Strata

Domain, employee stratum, thematic responses	Supporting quote
How patients acquire KPC	
Administration	
Patient contact	It's transmitted ... primarily through caregiver contact from one infected patient to another.
Middlelevel management	
Prolonged length of stay	I would say from prolonged care.
Patient contact	From the staff, if they are not careful; usually, it is transferred from staff to patients.
Healthcare facility exposure	When they have repeated long-term, chronic exposure to the healthcare system.
Frontline	
Patient contact	Contact with other patients that have KPC.
Transfer from facility to facility	I think it first started out in a skilled nursing facility. They always come from a different facility.
How we prevent the spread of KPC	
Administration	
Proper hand hygiene	Handwashing.
Proper PPE use	At this point, I would say we believe it's related to use of PPE.
Middlelevel management	
Proper hand hygiene	Good handwashing. Good hand hygiene.
Proper PPE use	Wear that PPE. Good PPE.
Frontline	
Proper hand hygiene	Proper handwashing ... handwashing technique. Make sure you wash your hands before ... and after you take care of your patient.
Proper PPE use	You have to obey the precautions.
What motivates staff	
Administration	
Patient safety	Certainly, from the patients that we serve, we want to make sure that as healthcare providers we are not the method or mode of transmission affecting others or introducing organisms to other patients.
Prevention is easier	An ounce of prevention is worth a pound of cure.
Cost	Because preventing infections ... is very costly in healthcare ... but when patients get these bugs, it extends their stay, they are placed on more medications, and the cost is incurred there. If the quality is addressed, the cost will take care of itself.
Middlelevel management	

Domain, employee stratum, thematic responses	Supporting quote
Patient safety	We have to take care of our patients because that's our number 1 priority here.
Personal safety	Myself first ... proper handwashing so I won't get infected with those germs.
Prevention is easier	So it is easier to nip it in the bud, rather than to let it become a nuisance like the other 2 [MRSA and VRE].
Frontline	
Patient safety	We don't want patients to get any sicker. Or spread it to other patients.
Prevention is easier	I don't want an epidemic of KPC. ... If we don't prevent, then it's going to get worse.
Perceived positive effects of bundle	
Administration	
Increased awareness	It enhanced awareness for prevention of spread of infection.
Improved behavior	Hopefully behavior changes [with PPE, hand hygiene].
Midlevel management	
Increased awareness	It made the staff more aware of the KPC. What to do and how to prevent it.
Improved behavior	Since we have started using the CHG cloths, we are avoiding the spread of KPC in the hospital.
Frontline	
Cohort of KPC-positive patients	They have been very strict if they find out that a patient is KPC positive, immediately they move and isolate the patient. ... It is very helpful to cohort the KPC cases on floor units because it reduces the rate of spread.
Decreased spread of KPC	At least now we are not spreading it [KPC] to other people.
Perceived negative effects of bundle	
Administration	
Perception/stigma	When you mention to them this is the floor for KPC and you explain what it is, they feel like, "Oh my God, I am afraid of walking on the floor."
Midlevel management	
Difficulty maintaining cohort	Maintaining our cohorts is probably the most difficult thing to do.
Frontline	
Dissatisfaction with CHG cloths	I don't think that the patients feel that they are clean with the cloths.
Lack of family understanding	The family members don't really understand the fact that we don't use soap and water.
Long-term effect on KPC control in Chicago	
Administration	
Create an example	Hopefully, develop the cohort methods as an example for other hospitals. Be an example for other facilities to be able to help control KPC.
Stronger relationships	Because we are developing stronger relationships from a business perspective with the nursing homes, maybe we could work with them and talk about the program as well. There might be a broader effect beyond just [us].
Decrease the spread	Hopefully, the interventions will prove to be effective and we can decrease the spread so we don't become a large urban pool for KPC, as some of the other big cities have done.

Domain, employee stratum, thematic responses	Supporting quote
Midlevel management	
Improved knowledge of KPC status	Patients will have a better infection history, moving from organization to organization so they can be better cohorted and isolated
Prevention and control of KPC	Keep it from spreading beyond our region. I am sure there are other facilities that have KPC, but we don't want an outbreak.
Frontline	
Increased awareness	People need to know about it. There are a lot of people from other hospitals who don't even know anything about KPC.
Prevention and control of KPC	It would decrease it. ... It would probably demolish KPC completely.
Advice to control KPC	
Administration	
Proper hand hygiene	I can't stress enough. Handwashing, handwashing, handwashing.
Proper PPE use	Diligent PPE ... that is the key. Wear your protective equipment.
Midlevel management	
Proper hand hygiene	It's all in your hands. Literally and figuratively.
Proper PPE use	Make sure they use protective equipment when they are entering the rooms.
Frontline	
Proper hand hygiene	You can never be too clean. Washing before and after, while you're inside. We wash before we go in, after we come out.
Proper PPE use	I always say just wear your PPE for every patient, because sometimes you never know.

NOTE. GHG, chlorhexidine gluconate; KPC, *Klebsiella pneumoniae* carbapenemase-producing Enterobacteriaceae; MRSA, methicillin-resistant *Staphylococcus aureus*; PPE, personal protective equipment; VRE, vancomycin-resistant *Enterococcus*.