reduce healthcare-associated infections in 2 Asia-Pacific countries.[6,7] These are essential prerequisites that hospitals should have in place to achieve successful MDRO IPC. In this study, we confirm that both hospital-level factors (ie, excellent safety culture and leadership support) and individual-level factors (ie, knowledge regarding implementation of intensified IC programs and involvement in collaborative networks) are important predictors for successful containment of MDRAB in hospitals with IDPs in Thailand.

We are aware of several limitations in this study. First, the small sample size limited our capacity to analyze other important factors potentially associated with successful containment of MDROs (eg, predictors for implementation of individual intervention and level of compliance needed to achieve successful containment of each intervention). Second, survey data were subject to recall bias associated with interventions that each IDP implemented. This bias was likely low given that all information was derived from hospital IC databases, including levels of compliance with each IPC intervention. Nonetheless, our study highlights some important modifiable gaps in MDRO containment. Further education regarding implementation of intensified IC interventions, along with sustainable IDP networks, is needed to contain the increase in MDRAB prevalence in this middle-income country.

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Wisdom of Microbial Pathogens: A Novel Approach to Develop Antimicrobials Against Methicillin-Resistant *Staphylococcus aureus*

To the Editor—Staphylococcus aureus is the one of the most commonly isolated human bacterial pathogens causing skin and soft-tissue infections, endovascular infections, osteomyelitis, pneumonia, endocarditis, septic arthritis, and sepsis. Methicillin-resistant *S. aureus* (MRSA) isolates have developed resistance to all available penicillins and other β-lactam antimicrobial drugs.[1] A few drugs, such as vancomycin (glycopeptide), daptomycin (lipopeptide), and linezolid (oxazolidinone), have been approved for the treatment of serious infections caused by MRSA. However, different MRSA strains have already been emerging with resistance to these last-resort antimicrobial drugs.[2–4] These resistance trends for newer drugs emphasize the ongoing need for new and more potent antimicrobial drugs. Successful pathogenic bacteria may have to outcompete other coinfecting bacteria to stay in their eukaryotic host, such as humans. This interplay between pathogenic bacteria may lead to development of new antimicrobials.

In the present study, 39 *Pseudomonas aeruginosa* isolates were screened against MRSA. *P. aeruginosa* were isolated from various patients admitted in different Indian health centers. Four different strains of MRSA were used for susceptibility assays. *S. aureus* ATCC 25923 was used as a control strain.

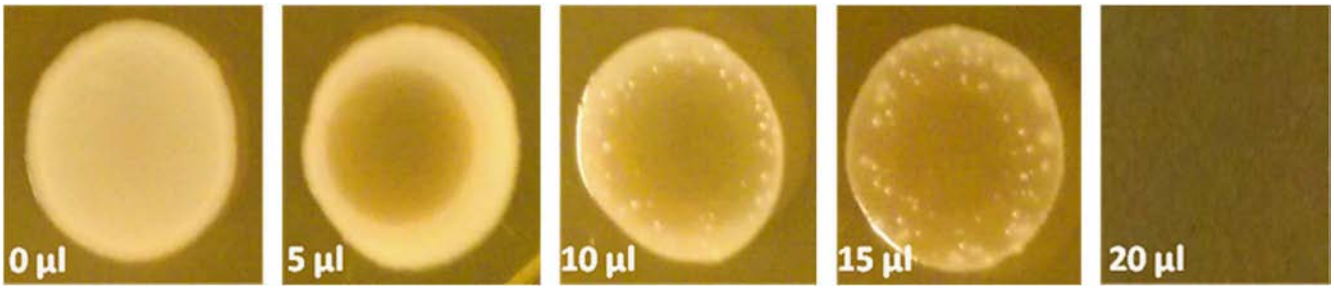

FIGURE 1. Antimicrobial activity of *Pseudomonas aeruginosa* P-149 supernatant (5–20 µL) against methicillin-resistant *Staphylococcus aureus*.

S. aureus cultures, grown overnight in Mueller-Hinton broth, were diluted to 0.5 OD_{600} (optical density at wavelength of 600 nm) and uniformly spread on Mueller-Hinton agar plate by using a sterilized cotton swab. Similarly, *P. aeruginosa* cultures were grown in Mueller-Hinton broth and centrifuged (10,000 *g*, 10 minutes) to collect the supernatant that was then filter sterilized. An aliquot (25 µL) was added to the *S. aureus* lawn followed by incubation at 37°C. The level of inhibition based on the presence of halo formation around the supernatant spot was defined as follows: "no inhibition" indicated as a halo less than 8 mm; "weak inhibition," 8–15 mm; "strong inhibition," 16–25 mm; "very strong inhibition," greater than 25 mm. Of the 39 *Pseudomonas* isolates, 28 (72%) failed to inhibit the growth of *S. aureus* whereas 7 (18%) and 3 (8%) showed weak and strong inhibition, respectively. Only 1 isolate (3%) was able to show very strong inhibition of *S. aureus* (>30 mm halo). The isolate P-149 that showed maximum inhibition was selected for further analysis. Supernatant aliquots of varying volumes from P-149 (0–20 µL) were spotted on *S. aureus* lawns. After 24 h of incubation, an inhibition halo was visible around the spot of supernatant (5 µL) with profound growth of *S. aureus* on the edges compared with the control (Figure 1). However, with further increase in the supernatant volume (10–15 µL), only discrete colonies were visible on the edges of the inhibition zone. Growth of *S. aureus* was completely inhibited with 20 µL aliquot (Figure 1). Even after 72 h of incubation, growth of *S. aureus* remained inhibited. The same trend of inhibition was observed with other *S. aureus* strains including the ATCC control strain. The study clearly suggests that P-149 supernatant could be a potential source for the development of an antimicrobial drug against *S. aureus*. It should be further noted that crude supernatant was used without any purification step. Extraction of the active antimicrobial drug with organic solvents (acetone, hexane, and dichloromethane; 1:1) was unsuccessful. Treatment with nucleases did not alter the antimicrobial activity either. Certain pathogenic bacteria have been reported to secrete proteins to outgrow or outcompete other pathogens in the human body.[5] However, even after treatment with proteinase K, the P-149 supernatant still retained its activity. Cytotoxicity assays revealed that the P-149 supernatant did not affect the growth of *Saccharomyces cerevisiae*.

Evidence demonstrates the increasing ineffectiveness of methicillin and newer agents, such as vancomycin and linezolid. The decrease in drug efficacy for *S. aureus* represents a looming threat to patient health with the fear of returning to the morbidity and mortality levels present before antibiotics were developed. Strategies adopted by pathogenic bacteria to keep their enemies at bay may provide an insight into the production of smart weapons.

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